REHOSPITALIZATION RISK FACTORS FOR MENTAL HEALTH AND SUBSTANCE USE IN NORTHERN BRITISH COLUMBIA

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Abstract

Mental health and substance use (MH&SU) rehospitalization rates are used as indicators of treatment quality, to reduce costs, and measure efficacy. Research on this topic in rural Canadian hospitals and communities is lacking. This study used secondary data on 5159 patients (age 15 and older) hospitalized with International Classification of Disease (ICD) F code MH&SU diagnosis. These patients had 9103 admissions to 18 hospitals in Northern British Columbia during a five-year period, April 1st, 2010 through March 31st, 2015. ANOVA and Tukey Post Hoc tests were used to examine associations of two performance measures with five patient factors; community size, Indigenous culture, relationship status, employment status, and ICD F code diagnoses.

The first measure was number of hospital readmissions. Of the 5159 patients with 9103 admissions, 3482 (67.6%) had one hospital admission during the five-year period. The remaining 1677 (32.4%) patients had 3944 (43.3%) of the hospitalizations). Patients whose cultural identity was Indigenous had over-representation and increased readmissions. Patients who were single and never in a relationship had increased hospitalizations. Patients whose ICD F coding for schizophrenia or psychosis had increased hospitalizations.

The second measure was wait time for community MH&SU follow-up. Of the 5159 patients, 4512 (87.5%) had contact with community MH&SU during the five-years. Urban communities with specialized MH&SU services had reduced wait times for follow up. Patients whose cultural identity was Indigenous had longer wait times for community MH&SU follow-up. Patients who were divorced or separated had longer wait times. Patients with ICD F coding for schizophrenia or psychosis had shorter wait times for follow-up.

The relationship between hospital readmission and community MH&SU follow-up was examined using logistic regression with the five factors. An inverse relationship was found between the two performance measures. Patients who did not have community MH&SU follow-up within 30 days had reduced odds ratio of readmissions, whereas patients who had follow-up within 30 days had increased odds ratio for readmissions. Although the study finds support for patient risk factors, evidence suggests approaches like a Decision Support Tool (DST) might provide reliability for intervention, and resource planning, as well as timely intervention.

Keywords: mental health, substance use, readmission, community follow-up, Northern, rural, Indigenous, marital status, employment status, ICD F code, Decision Support Tool (DST)

Acknowledgement

This research study resulted from years of preparatory work and the efforts of many people. Queries about the efficacy of two Mental Health and Substance Use (MH&SU) quality performance measures began when British Columbia created the Regional Health Authorities in 2002, and the Ministry of Health (MOH) applied these measures to MH&SU programs in hospitals and community services at Regional Health Authorities in the Province.

As a Regional Director for MH&SU with Interior Health, one responsibility was to improve outcomes on the two performance measures by operationalizing MH&SU services. To better understand existing processes, Elsa Felker completed a research project using available Interior Health hospital and community data. Her MSW thesis: "*After discharge from hospital, where do we go? Follow-up of clients with mental illness and/or addiction: 30 days post-acute care"* answered some questions, but raised additional ones due to the limited available data.

When I moved to Northern British Columbia, my regional leadership role in Northern Health provided opportunity to restructure and integrate mental health and substance use services across the health region for all levels of care (communities, residential and treatment facilities, and hospital units). Following the integration, all MH&SU services in the region began using a new integrated MH&SU Minimum Reporting Requirements (MRR) clinical information system; which captured most of the factors extracted for this research.

The creation of the MH&SU MRR factors and definitions was a multi-year process led by the Ministry of Health, Mental Health and Substance Use Branch, and the regional health authorities. Due to having integrated services, Northern Health became the pilot health authority to trial the community clinical MH&SU MRR system. MH&SU Information staff

developed a method to extract clinical and demographic data from the MRR system for analysis. The Performance and Quality branch did basic analysis with the data which raised further questions. After conducting a literature review, it was proposed to use the new community integrated MH&SU MRR data, and match it with the Discharge Abstract Database (DAD) from the 18 hospitals to learn whether meaningful information could be ascertained regarding the two performance measures. If the data combination provided meaningful results, there might be factors or transition points identified that could lead to service improvements; a premise behind this dissertation.

I wish to express my appreciation to my committee supervisor, Professor Emeritus Dr. Glen Schmidt, School of Social Work, for on-going support of this multi-year project; his expertise and many reviews of the drafts; and co-supervisor Professor Dr. Shannon Wagner, Dean Faculty of Human & Health Sciences, who saw the potential of the research topic and recommended the statistical methodologies. Thanks also to committee members, Professor Dr. Jalil Safaei Boroojeny, Chair Department of Economics; Associate Professor Dr. Caroline Sanders, School of Nursing; and Associate Professor Dr. Mamdouh Shubair, School of Health Sciences, for their patience during the time it has taken to complete this research.

I also wish to acknowledge the support that Elsa Felker my wife, and daughters Dara Campbell and Kora Campbell provided. They understood the meaning this research topic had for me professionally, while realizing it meant less family time during the process.

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CHAPTER 1

Rehospitalization Factors for People with Mental Illness or Substance Use Diagnoses at Generalist Hospitals in Northern British Columbia.

> Hospitalization is a complex, individually determined experience. Clinicians and service users have differing perspectives on the causal risk factors and this presents complications for those developing relapse prevention strategies. However, a shared appreciation of the multiple realities paves the way for the development of a conceptual risk-factor identification model which may serve as a guide to practitioners in relapse prevention. (Mgutshini, 2010, p. 257)

Introduction / Background

Decreasing rehospitalization episodes has been a goal for psychiatric treatment facilities since the deinstitutionalization process began. Psychiatric readmission episodes occurring within 30 days of a previous discharge have been considered a significant problem due to lengths of hospital stay, even though patients may relapse due to the course of a severe and persistent mental illness. Health care officials and policy administrators have adopted the view that rehospitalizations are preventable, and if they occur, they are reflective of either incomplete inpatient treatment, or poor compliance with community aftercare. As a result, rehospitalization rates are used in numerous jurisdictions as indicators of service quality, ways to reduce operational costs, or measures of treatment efficacy.

Research studies have examined readmission rates to try and identify causes, whether by population descriptors or by areas of intervention. Most studies focused on urban hospitals

that have inpatient psychiatric wards and specialized services. The findings from these studies have identified clusters of descriptors and clinical patterns, but lack consensus on specific causes of readmissions. The literature review found a lack of research on psychiatric patient readmissions in rural generalist hospitals in Canada. The focus of this research study is to use existing data to identify factors associated with hospital readmissions and community mental health and substance use follow-up for patients with mental health and addictions issues who were admitted to generalist hospitals in Northern British Columbia. The aim is to expand knowledge regarding readmission factors in a northern rural health care region, and provide information to improve services for people who are hospitalized with mental health and substance use issues.

The following section provides chapter overviews on the geographic context such as distances, sizes of communities, small population numbers, and percentage of Indigenous residents in Northern British Columbia. Following this, the responsibilities for health care service provision by the regional and provincial Health Authorities are described, as well as health care services in First Nations communities, which are provided through the First Nations Health Authority (FNHA).

Chapter Overviews

Chapter 2 explores the research problem, what early readmissions mean to the health care system, and examines the definitions of rehospitalizations and readmissions used in the literature. This is followed by research questions to be explored in the study, and factors that could either affect or limit findings on the research questions.

Chapter 3, the literature review, examines the rationale for using readmission rates as a measure and the terminology for concepts on the topic of readmissions, relapse, recidivism,

the use of terms regarding patients, and discussion on frequent and rapid readmissions. The section also examines factors that have been used as readmission predictors, as well as numerous factors and variables (e.g. socio-economic, demographic, and clinical) that have been studied, with discussion on the lack of consistency or consensus on causes of hospital readmissions. The variables or factors that have been researched are organized into groupings based on whether they are "Static" (demographic, socio-cultural, socio-economic, and relationships; "Clinical" (signs and symptoms, diagnostic categories, symptom severity, and previous hospitalizations), or "Modifiable" (lengths of stay, hospital program effectiveness, and community MH&SU follow-up).

Chapter 4 considers effects that rural determinants of health can have on mental health and substance use, plus effects of reduced access to rural and remote mental health care and substance use treatment. Focus is paid to the impact of colonization and rurality on the health status of Indigenous people, particularly in Northern and remote communities.

Chapter 5 explains the research atheoretical framework, data collection, measurement constructs, and hypotheses. Based on the Mental Health Commission of Canada (MHCC) view that no overarching theory for mental health and substance use research has been developed; this study used atheoretical methodology. The next section in the chapter focuses on data collection definitions and measurement specifications, and well as descriptions of the denominators and numerators used to determine the study population. The research questions and hypotheses are stated, followed by a description of the statistical methodologies

Chapter 6, Findings uses Analysis of Variance (ANOVA) to examine the two Ministry of Health and CIHI quality performance measures. The first measure, "Readmission to a hospital within 30 days" is compared with five (5) variables using ANOVA, Tukey's HSD

and Post Hoc tests are used to determine statistical differences with each factor, and their significance with the readmission performance measure. A parallel process using ANOVA, Tukey's HSD and Post Hoc tests are applied to the second performance measure, "Community Mental Health and Substance Use follow-up within 30 days" to examine the same five variables in relation to this performance measure. Following this, Logistic Regression is used to analyse the statistical association of the two quality performance measures in relation to each other, as well as the influence of the five selected factors.

Chapter 7 discusses the statistical findings in relation to literature on the two performance measures, and each of the five factors. The findings for each factor and performance measure are considered on whether they support the literature, are different from the literature, or provide new information that was not found in the literature.

The chapter concludes with a discussion of possible applications of the findings to policy development and organizational service provision. A Decision Support Tool (DST) and integrated hospital, community and primary care, patient-centred approach and process is suggested. Limitations of the research are reviewed, with commentary on cultural and ethical considerations for this quantitative research design, as well as dissemination of the results.

Appendix E contains frequency and descriptive findings of the patient population and variables applied to the two quality performance measures in this research.

Northern British Columbia – Profile

Geographical Context

Northern Health is one of five regional Health Authorities in the Province of British Columbia. Its mandate is to provide a full range of health care services (acute, residential, and community), to a population of almost 290,000 residents in northern British Columbia; about 7% of the Province's population. Serving an area of 592,116 square kilometers (the size of France), Northern Health is the largest geographic health region in the province, covering 64.0% of the provincial land base, and due to the small population base, comprised mostly of rural and remote communities.

Of Northern Health's overall population of 289,974, there are 48,050 Indigenous people, who represent 35.6% of the Indigenous population of the Province of British Columbia (Government of Canada, 2016). Provincially, the overall percentage of the Indigenous population is 4.8%. In comparison, Northern Health region has the highest percentage of Indigenous residents at 16.6%. Within Northern Health, the population percentages of Indigenous residents vary in the three Health Service Delivery Areas (HSDA). In the Northwest HSDA 30.0% of the population is Indigenous, compared to 13.2% in the Northern Interior HSDA, and 12.4% in the Northeast HSDA. For First Nations people with "status", approximately 60% live off-reserve and 40% live in First Nations communities (Northern First Nations Health Partnership Committee (NFNHPC), 2013). Northern Health provides health care in 25 Northern towns and centres through 18 hospitals and 7 health centres. In addition, there are 54 First Nations communities, plus smaller villages providing a total of 80 settlement sites. Most of the First Nations communities have a health centre, often

served by visiting physicians and nurses, supported by allied health professionals (NFNHPC, 2013), with the acute medical care being provided at the 18 hospitals run by Northern Health.

The Northern Health region is organized geographically into three Health Service Delivery Areas (HSDAs): Northeast (NE), Northwest (NW), and Northern Interior (NI). The following health care services are offered in communities across the North:

- Acute care services at 18 hospitals (three are HSDA regional centres), plus seven diagnostic and treatment health centres;
- Residential long-term care at 23 facilities (in communities with acute care hospitals);
- Home support and home care nursing visits to patients in their homes;
- Mental health and substance use services community teams, that include a network of inpatient, day treatment programs, medication clinics, and specialized teams; plus
- Population and public health services that focus on health promotion, environmental health, and injury prevention.

Northern Health employs more than 7,000 people in the equivalent of 4,000 full time staff positions. In addition to staff, Northern Health works collaboratively with medical staff comprised of 250 Primary Care physicians in the communities, plus 125 medical and surgical specialists in hospital programs. Community mental health and substance use (MH&SU) services are provided to all 25 communities in Northern British Columbia.

Of the 18 Acute Care Hospitals in the North, three are HSDA regional hospitals with inpatient psychiatric units, and nine hospitals have an observation unit designated under the Mental Health Act. The six non-designated acute care hospitals can certify a patient using the Mental Health Act, then transfer the patient to one of the 12 designated hospitals for assessment and treatment. In comparison, the seven diagnostic and treatment health centres

are open seven days a week during day-time hours to triage patients, and then transfer patients who require hospitalization to one of the 18 acute care hospitals.

Table 1 *Northern Health – HSDAs, Communities, Hospitals, Obs Units, & Health Centres*

Northwest HSDA	Northern Interior HSDA	Northeast HSDA
Atlin (HC)	Burns Lake (Hospital-O)	Chetwynd (Hospital)
Dease Lake (HC)	Fort St. James (Hospital)	Dawson Creek (HSDA-Hospital-Psych)
Haida Gwaii (Masset) (Hospital)	Fraser Lake (HC)	Fort Nelson (Hospital-O)
Haida Gwaii (Queen Charlotte) (Hospital-O)	Mackenzie (Hospital)	Fort St. John (Hospital-O)
Hazelton (Hospital-O)	McBride (Hospital)	Tumbler Ridge (HC)
Houston (HC)	Prince George (HSDA-Hospital-Psych)	
Kitimat (Hospital-O)	Quesnel (Hospital-O)	
Prince Rupert (Hospital-O)	Valemount (HC)	
Smithers (Hospital-O)	Vanderhoof (Hospital)	
Stewart (HC)		
Terrace (HSDA-Hospital-Psych)		

Note: HSDA-Hospital-Psych = Regional Hospital with Specialized Psychiatric Inpatient Unit, Hospital = Generalist Hospital, O = Observation Unit, HC = Health Centre (day-time).

The extensive geographic distance in Northern British Columbia provides challenges in delivering a continuum of quality health care services to rural and remote areas. The small clusters of populations scattered across large distances, plus economies of scale make the

provision of specialized services difficult to achieve in remote areas. Travel limitations due to a lack of paved roads, plus winter weather conditions can complicate patients readily accessing specialized levels of care.

In addition to health care services provided by the British Columbia Regional Health Authorities, such as Northern Health; Indigenous people can access health care that is Health Canada Federally funded through the First Nations Health Authority at health centres located in most of the 52 First Nations communities across Northern British Columbia.

CHAPTER 2

Research Problem

"Early return to hospital is a frequently measured outcome in mental health system performance monitoring yet its validity for evaluating quality of inpatient care is unclear."

"Is readmission a valid indicator of the quality of inpatient psychiatric care?" (Durbin, J., Lin, E., Layne, C., & Teed, M., 2007)

Research Focus

Rationale: The Canadian Institute of Health Information (CIHI), the Mental Health Commission of Canada, the British Columbia Ministry of Health, and most health care organizations have generally accepted the premise that increased community follow-up of mental health and substance use post-hospitalization will result in longer stays in the community and reduced rates of rehospitalizations within 30 days. They note, "Often readmission for patients previously hospitalized for a mental illness indicates relapse or complications. However rapid readmission may reflect lack of stabilization during the previous hospitalization, poor discharge planning, or inadequate community support" (Mental Health Commission of Canada, 2015, p. 7). This indicator is routinely tracked in all the Provinces by the Canadian Institute for Health Information as a key measure of system performance.

These beliefs, and use of hospital readmissions as a measure, are also supported by the American National Association of State Mental Health Program Directors (NASMHPD) who stated – "avoidable hospital readmissions are receiving increasing attention, as they are generally seen as indicators of poor quality of care and inefficient use of healthcare resources.

Management of transitions is a key concept for addressing re-hospitalization and involves the coordination of care across the silos of mental health, general health, and substance abuse, as well as social services" (NASMHPD, 2015, p. 4).

Although research has not concluded that readmission within 30 days is an indicator of poor-quality care; readmissions within 30 days has been adopted widely as a measure for quality performance. In 2017, the United States Centers for Medicare and Medicaid Services (CMS) adopted the 30-day all-cause readmission rate measure for performance reporting as part of a national Inpatient Psychiatric Facility Quality Reporting program (CMS, 2017). The readmission within 30 days measure now applies to all inpatient psychiatric services provided by psychiatric hospitals or psychiatric units in Acute Care Hospitals (ACHs) or Critical Access Hospitals (CAHs) in the United States that participate in Medicare funding (CMS, 2017). To encourage participation in using this performance measure, it is pay-for-reporting, meaning eligible facilities can be penalized by being paid less by Medicare if they do not participate.

The two performance measures, hospital readmissions within 30 days, and community follow-up post-hospitalization within 30 days, are used provincially, nationally, and internationally in health care as performance and quality indicators. Due to this numerous research studies have been conducted to test the validity of these assumptions and assess which factors are malleable for quality and performance improvement. Research results have not provided conclusive evidence that either performance measure provides the quality assurance being sought. Depending on hospitals and community resources where the studies occurred, and the clinical population included in the studies, the results have varied for both measures and have not been consistently conclusive.

The Literature Review chapter examines numerous factors that have been researched regarding the two performance measures, such as; lengths of hospital stay, intervals until community follow-up occurs, diagnostic clusters, as well as socio-economic, and demographic considerations. Some research indicated certain clusters of factors may lead to increased influence, however many articles concluded most factors are non-malleable by health care providers, so not influenceable. Other studies examined specific population and diagnostic profiles to try and identify patients who may be at increased risk of hospital readmissions. Overall, the research studies included different variables, varied in methodology, did not consistently focus on 30-day readmissions, and were conducted with different cultural groups and organizational systems. These variations make external validity for each study's findings difficult to confirm. In addition, most research on this topic was conducted in urban centres with specialized psychiatric and mental health services. No studies were located that examined the two performance measures in rural and Northern communities served by generalist hospitals with limited access to specialized inpatient and community-based programs and services.

Early Readmissions

Health care information from the United Kingdom, Australia, United States, and Canada shows that 10% to 13% of patients who had been hospitalized for a mental health issue are readmitted within 30 days after they were discharged from the psychiatric unit (Agency for Health Care Research and Quality (AHRQ), 2015; Canadian Institute of Health Information (CIHI), 2012; Leslie, & Rosenheck, 2000; Madi, Zhao, & Li, 2007; Organisation for Economic Co-operation and Development (OECD), 2013; Thompson, Shaw, Harrison,

Ho, Gunnell, & Verne, 2004; Vigod et al., 2013a). The term "early readmission" is usually defined as being within 30 to 90 days of discharge and its occurrence is viewed as a potentially negative clinical outcome for patients. The high costs of health care emergency department visits and inpatient psychiatric treatment make readmissions an important economic issue for governments and health care organizations. Due to this, psychiatric readmissions have been adopted as a quality of care indicator internationally, with governments setting benchmarks for organizations to reduce the rates of early readmissions (CIHI, 2011; CIHI, 2012; Hermann & Mattke, 2004; Hermann et al., 2006; Mental Health Commission of Canada, 2015; Vigod et al., 2013b).

When focusing on readmissions as an indicator, it should be recognized that psychiatric rehospitalizations do not solely reflect the quality of inpatient care provided (CIHI, 2012, Zhang, Harvey, & Andrew, 2011), but also includes the transition from the hospital, plus the continuity of care services provided by the community mental health and addictions system, as well as other community-based services (Durbin, et al., 2007; Rumball-Smith & Hider, 2009). The measure may be more a reflection of the ability of hospital wards, and the mental health and addiction system, to provide coordinated care and support for patients to help them transition from the hospital to appropriate care and supports in the community. While there has been a great deal of research on readmissions and hospital care, there is limited evidence regarding interventions designed to optimize patient transitions to community-based services (Vigod, et al., 2013a).

Rehospitalizations and Readmissions

Rehospitalization rates are used as indicators of quality or measures of treatment efficacy. The occurrence of an early readmission (within 30 days) is considered problematic because healthcare providers and quality assurance staff believe these early relapses should be preventable, without being specific as to how or why. An accepted focus by health care providers has been to reduce the number of hospital readmissions within 30 days; however, it is not clear why 30 days was chosen, particularly as a target or measure for mental health and substance use readmissions.

Vaduganathan, Bonow, and Gheorghiade (2013) stated: "The 30-day point does not have a clear biological, clinical, or therapeutic evidence base." Instead, they see the focus on the 30-day timeframe as underestimating the actual readmission burden. They also pointed out evidence that short-term strategies to reduce early readmissions may have little effect on the majority of readmissions, and concluded the effects of interventions on early hospital readmissions are poorly defined.

Instead of focusing on the 30-day quality measure, Vaduganathan et al. (2013) note there are other quality measures that include; total hospital admissions, lengths of stay, and in-hospital mortality, all of which have significantly improved over the past decade (based on United States Medicare data), which likely reflects the increased use of evidence-based therapies and hospital adherence to national performance measures. They concluded 30-day readmissions as a stand-alone measure have not demonstrated any improvement during this time, and pointed out it is unclear whether this is due to inadequate efforts in post-discharge care, or intrinsic problems with the quality measure itself.

Vaduganathan et al. (2013) also note the current definition of 30-day readmissions fails to discriminate between "good" and "bad" readmissions. They believe some hospital readmissions may be "good" as they provide additional opportunities for health maintenance, medication trials and stabilization, therapeutic interventions, and patient education. In the case of "bad" readmissions, they referred to Joynt and Jha's (2012) study that found a substantial percentage of rehospitalizations may be unavoidable because of the influence of fixed ("static" or "non-modifiable") socio-economic, geographic, and structural factors in patients' lives.

Van Walraven et al. (2011) found that current estimates of the proportion of urgent readmissions that are avoidable were unreliable. Their study concluded that some urgent readmissions could be deemed potentially avoidable, they were relatively uncommon, and comprised less than 20% of all urgent readmissions in the six-months following hospital discharge. The result of this is that hospitals might not be able to reduce unneeded readmissions because of the influence of factors beyond the control of the hospital, and the interventions and treatments ("modifiable" factors) that might be able to reduce the number of 30-day readmissions have not been clearly delineated.

The focus of this research study is to analyse five selected factors associated with patients who had been hospitalized in the 18 hospitals in Northern British Columbia for mental health and substance use issues during a five-year period. These factors are examined for their association to the measure of wait times (using mean grouped days) for community MH&SU follow-up; plus, the second measure regarding whether patients were readmitted within 30 days of discharge (using mean numbers of readmissions). The study is a retrospective cohort design that encompasses all the patients who were hospitalized for a

mental health and/or substance use issue, looking at the influence of community MH&SU follow-up rates compared to numbers of hospital readmissions that occurred. The five research factors or variables examined were extracted from hospital data and community mental health and addictions information. The hospital's clinical, diagnostic, and length of stay information was linked with the patients' demographic and socio-economic information from community mental health and addictions programs and services, to learn the strength of association these five factors might have with the two quality performance measures.

CHAPTER 3

Literature Review

Readmission Rates: Rationale for Use

It has generally been thought that hospital readmissions represent a potentially important indicator for an assessment on the continuum of mental health services (Hermann & Mattke, 2004; Hermann et al., 2006; OECD 2013). Readmission rates have been considered an appropriate and useful measure of treatment outcome, and continue to be utilized to determine the success of inpatient hospitalization treatment. Rates of readmission provide simple, practical, and relatively accessible data that is measurable, and allow comparisons at various organizational and governmental levels. Readmissions to psychiatric inpatient facilities are also conceptualized as significant concerns for patients, hospitals, and governments in terms of quality of life, utilization of health care resources, and mental health care funding (Taylor, LoPiccolo, Eisdorfer & Clemence, 2005).

In addition to readmission rates being conceptualized as an indicator of treatment or hospital success, it is also a measure with practical value. The data is generally available at most hospitals, and it has been accepted as a reliable quality and performance measure nationally (Durbin, et al., 2007; Montgomery & Kirkpatrick, 2002; Ortiz, 2019; Rumball-Smith & Hider, 2009). With hospital computer systems, it is usually clearly documented whether a patient has been admitted to a hospital after an admission screening decision. Each admission is documented in the medical record providing clinical information about every episode of care. The admission information is based on numbers and codes, meaning no interpretation of written hospital charts, care notes, or self-report scales is needed to determine whether an admission occurred. Within the total number of hospital admissions, readmissions

are examined as a sub-set of events that are considered costly for mental health care, and disruptive for patients and their families (Lin & Lee, 2008; Ramírez García, Wood, Hosch, & Meyer, 2004; Sullivan, Wells, Morgenstern, & Leake, 1995; Taylor, LoPiccolo, Eisdorfer, & Clemence, 2005; Vogel & Huguelet, 1997). Admission and readmission rates also provide criteria for performance indicators, including feasibility, costs, and validity, all of which are significant in health care.

Unplanned readmissions for mental illness and substance use to a hospital are generally considered undesirable events that indicate a relapse in the system of care, and a reflection on the effectiveness of the system of mental health and substance use care as a whole (Cougnard et al., 2006; Lyons et al., 1997; Nelson, Maruish & Axle, 2000; Ortiz, 2019; Romansky, Lyons, Lehner, & West, 2003). Readmissions often coincide with a disruption of treatment and rehabilitation, and may indicate instability and a recurrence of symptoms of the illness.

Raising the question of whether readmissions are avoidable, Sullivan, Young, and Morgenstern (1997) noted some hospital admissions may be unavoidable for persons with chronic, exacerbating illness, and suggested not all readmissions are indicative of poor quality of care during the index hospitalization. This view was supported by Morgan, Korten, and Jablensky (2006) who stated, “there are occasions where hospitalization is an appropriate response to a psychotic episode, and at least one study has demonstrated the potential for community care programs directed at vulnerable psychiatric patients to increase readmission rates” (p. 689). They concluded hospitalizations remain proper interventions at times of individual crisis, but should not be a result of a potentially avertable deterioration precipitated by a crisis or lack of community support (Morgan, Korten, & Jablensky, 2006).

Due to concerns about the causes of hospital readmission, numerous factors have been examined in research studies to assess co-relational or statistical associations to identify factors that might affect rates of readmission. While there are general themes in the factors that have been examined, there are variations in the research studies with settings, populations studied, parameters, and definitions for the variables or factors studied. Some of these are:

Time frames for readmissions. Studies reviewed for this research defined rehospitalization or readmission as an admission to the hospital after the initial index admission, however, the time frame in which the readmission occurred varied widely. The wide variation in timeframes used made it difficult to compare studies and draw conclusions about rates and causes of readmissions.

The ranges in readmission timeframes in the literature include a range of periods of time, from: 0-3 days, 4-7 days, 8-15 days, 16-30 days, and over 30 days (Dharmarajan et al., 2013), 30 days (Monnelly, 1997), 30 to 90 days (Durbin, et al., 2007), 30 days or 6 months (Lyons et. al., 1997), 3 months (Sullivan et al., 1995), 6 months (Coleman, Paul, & Schatschneider, 2007), 3 to 12 months (Craig, Fennig, Tanenberg-Karant, & Bromet, 2000), 12 months (Hendryx et al., 2003; Kolbasovsky, Reich, & Futterman, 2007; Taylor, LoPiccolo, Eisdorfer, & Clemence, 2005).

A related measure used was the number of admissions within a time period: 2 or more admissions in 13 months (Bobo et al., 2004), 3 hospital stays for mental illness in 1 year ("Revolving Door") (Canadian Institute for Health Information, 2014); 1 readmission in 1 year, or 2 readmissions in 3 years (Weiden, & Glazer, 1997), a 15 month period broken down into 30-day, 60-day, and 90- day periods (Moran, Doerfler, Scherz, & Lish, 2000), 15 months (Perlick, Rosenheck, Clarkin, Sirey, & Raue, 1999), 2 years (Rea et al., 2003), any admission

lasting more than 24 hours during a 3 year follow-up period (Ramírez García, Wood, Hosch, & Meyer, 2004), and 7 years, which included one-year rates (Irmiter, McCarthy, Barry, Soliman, & Blow, 2007).

Percentage rates of readmission. The literature lacked consensus on what might be an acceptable percentage rate of readmission. The percentages for psychiatric readmissions reported in research studies varied from 4% up to 87% with no definitive agreement on what an acceptable rate was, for which populations, with what stipulations, or within what timeframe. Mgutshini's (2010) exploratory study that determined research on this topic found 37% up to 53% of hospitalized mental health patients were readmitted within 12 months of discharge. Using Canadian Institute Health Information (CIHI) hospital data, Madi, Zhao, and Li (2007) found in 2003-2004, 37% of patients with a mental illness who had been discharged from an acute care hospital were readmitted within one-year of discharge. They compared this percentage to the 27.3% of patients who were readmitted due to a medical illness.

An American study of almost 200 state psychiatric hospitals by Ortiz (2019) found on average 8% of discharges were readmitted to the same psychiatric hospital within 30 days, ranging from 0% to 18%. The author noted these percentages were lower than other findings as their study focused on readmission to the same hospital; plus, other research analysed readmission of an admission cohort, whereas their research used a discharge cohort (Ortiz, 2019).

Durbin, Lin, Layne, and Teed's (2007) meta-review of mental health readmission studies found a considerable range in reported readmissions rates within 30 days, from 7% to 17%. Durbin et al. (2007) attempted to determine an acceptable rate of readmission from

their review of literature on rapid readmissions, but concluded they could not do so definitively. The authors cited the limited evidence base and the wide number of variables, commenting the large number of variables used in studies was problematic when trying to determine an appropriate rate for readmissions. Their review noted Ontario had an average rate of readmission of 12.3% in 2004, and the United Kingdom set a goal of 12.3% for readmissions to an emergency room (different criterion from medical wards). They also reported the United States set an industry standard of 13% for mental health readmissions. Using a 13% target was supported by Madi, Zhao, and Li (2007) in their Canadian Institute for Health Information (CIHI) survey of mental health admissions in Canadian hospitals.

The 13% target was similar to the CIHI *Health Indicators 2011* report on 30-day acute inpatient readmissions for mental illness readmissions. Using 2009–2010 data, CIHI found about 12,618 patients with selected mental illnesses were readmitted to acute inpatient care in jurisdictions across Canada, providing a rate of 11.4%. However, CIHI noted the data for their 2011 report was not provided consistently by the health care jurisdictions, and not all ICD F Code mental illness and substance use diagnoses were included when determining this percentage rate (Canadian Institute of Health Information, 2011).

Readmission terminology. In addition to timeframes and percentages, the terms used to specify what a readmission is, are problematic as no standardized definition is used in the literature. The terms - rehospitalization, readmission, rapid readmission, relapse, recidivism, rapid and delayed readmission, frequent readmissions, and revolving door admissions, are all used interchangeably in the studies (Craig, et al., 2000; Geller, 1992; Montgomery & Kirkpatrick, 2002; Perlick, et al., 1999; Strack, Deal, & Schulenberg, 2007; Taylor, et al., 2005; Vogel & Huguelet, 1997; Weiden & Glazer, 1997; Weiden & Olfson, 1995). Using

these terms interchangeably is even more problematic when the timeframes in the studies are also non-standard. This means the measures used are not consistent, and it is unclear if similar patient characteristics are specified. Among these readmission terms, the use of relapse and recidivism pose a challenge as they have additional meanings and values.

Relapse. Falloon (1984) noted there was no uniform definition for relapse, and studies often use a hospital readmission as the criterion to confirm a relapse. However, this criterion lacks validity as a relapse can be influenced by the disease process rather than solely by the individual or their situation. Several authors noted readmission may indicate a process that reflects patient, family, hospital, and community dynamics (Montgomery & Kirkpatrick, 2002), and hospital admission policies of a community (Lyons, et al., 1997), or a social intervention reflective of an inability to function, more than solely the presence of symptoms (Falloon, 1984). Weiden and Olfson (1995), in their review of the cost of relapse in schizophrenia, noted these same issues with the use of the term relapse in the literature, including the lack of definition and wide variability of its use in the studies. Several studies recognized relapse and readmission as two separate phenomena to be considered (Doering et al., 1998; Kopelowicz, Zarate, Smith, Mintz, & Liberman, 2003; Rea, Tompson, Miklowitz, Goldstein, Hwang, & Mintz, 2003).

Recidivism. Recidivism is another problematic term used in the literature to describe readmissions. Recidivism usually has a legalistic context that implies a connection between criminal behaviour and psychopathology (Montgomery, & Kilpatrick, 2002). Using this value-laden term (compared to readmission) adds to the stigma of mental illness and hospitalizations by accentuating this negative aspect. Despite these terminology difficulties,

several studies use the terms recidivism, readmission, and rehospitalization interchangeably (Craig, et al., 2000; Miller, Beck, & Fraps, 1984; Strack, et al., 2007; Taylor, et al., 2005).

Patient terminology. A variety of similar terms are used to describe patients, such as; rapid readmissions, frequent users, frequently rehospitalized, frequent flyers, revolving door, frequent readmission, and early readmission, all have been used in the literature to describe patients who are readmitted to a hospital, either quickly after the initial admission, or several times during a specified time frame (Craig, et al., 2000; Montgomery, & Kirkpatrick, 2002; Moran, et al., 2000; Vogel, & Huguelet, 1997; Weiden, & Glazer, 1997). When using terms that could label, health care providers should remember that frequent admissions make it difficult for a person to hold a job, maintain a place to live, keep meaningful social relationships, be involved with family, care for children, and function in society, all of which confound the problem of having a mental illness.

Frequent readmissions. Some researchers provided definitions of the terms "revolving door", or "frequent user". The definitions were; three admissions in one year (Vogel & Huguelet, 1997), one hospitalization in the past year or two in the past three years (Weiden, & Glazer, 1997), a readmission within 15 months (Perlick, et al., 1999), two or more readmissions in 13 months (Bobo, et al., 2004), one admission in one year (Montgomery, & Kirkpatrick, 2002), and three or more readmissions in 12 months (Fisher, & Stevens, 1999). The variations in definitions make it difficult to know what a frequent user or revolving-door patient means to the findings. Also, the studies did not provide any specification on how many readmissions would be considered problematic, or for which reasons.

Rapid or early readmissions. The terms rapid or early readmissions differ slightly from frequent in that they refer to a readmission in a very short and non-specified period of time from discharge. However, the number of readmissions is not part of the criteria; rather it is the length of time since the discharge from initial admission that is the criterion. Sullivan, Young, and Morgenstern (1997) suggest rapid or early readmissions are problematic and disruptive similar to frequent readmissions. In their review of literature from the period 1995-2006, Durbin et al. (2007) defined rapid readmission as a readmission that occurred within 30-90 days of discharge, with results indicating the period of greatest risk is 30 days post-discharge. They found as the period of time for follow-up increases, the influence of the reason for the initial admission diminishes on the reason for readmission, and other social and environmental factors come into play (Durbin et al., 2007).

Moran, et al. (2000) found rapid readmission may have significant clinical implications "because acute deterioration may reflect inadequate treatment or more severe and complicated psychosocial problems". In their review of readmissions, focusing on 30-day readmissions, Moran et al. (2000) reported almost 40% of patients who were readmitted were readmitted within 30 days of discharge, and 15% were readmitted within seven days. Their findings suggested the first month after discharge is a particularly crucial time in the readmission cycle (Moran, et al., 2000).

Two other studies that looked at early readmission timeframes reported 45% occurred within 30 days (Monnelly, 1997), and 43% to 66% within three months (Craig, et al., 2000). Both these studies cited clinical factors (patient instability) as predictors of readmission and suggested using rapid readmission rates may be appropriate as an outcome measure on quality of treatment.

Problems with the Construct of Readmission

The actual value of readmission as a measure of hospital effectiveness and its problems with definition, measurement, and terminology have made this seemingly straightforward construct difficult to interpret and standardize in the literature. There is no consensus in the literature as to what an appropriate or meaningful measure of readmission is or what an acceptable rate of readmission is. Holsten (2011) reviewed 15 years of studies on psychiatric hospital readmissions in the United States that were published from 1995 to 2010. Twenty-three studies were reviewed with 19 different operational definitions of readmission, and no rationale or explanations offered in most of these studies as to why the construct (readmission) was measured in the way it was in the research (Holsten, 2011).

Appropriate measure of effectiveness. While readmission rates continue to be utilized as a measure of hospital effectiveness, several studies have questioned the value of readmission data as a useful or meaningful measure of quality of care. In an examination of readmission as a useful construct, Montgomery and Kirkpatrick (2002) noted that significant problems with definitions and methodological issues in the literature on readmission weaken both the validity and usefulness of readmission as a criterion measure of program performance. The authors also noted that measures of outcome are more complex than a single readmission statistic and should be "congruent with the facility's mission statement, linked to other outcomes, consistent with other programs for comparisons, consistent use and measured over time" (p. 22).

Lyons et al. (1997) conducted a study of predictors of hospital readmission to determine if readmission could serve as a quality indicator for inpatient psychiatric care and concluded that the data did not support readmission as a quality of care measure at that time.

Lyons et al. examined clinical predictors of readmission, and readmission due to poor hospital outcome or early discharge, utilizing clinical data collected at admission and discharge; to determine changes in distress, symptom acuity, and level of self-care. The authors concluded it might be possible to predict which patients are at risk for readmission, however having a poor outcome from the initial admission was not one of the risk factors that could be used.

In contrast Durbin, et al. (2007) suggested that readmission was a valid indicator of the quality of inpatient psychiatric care. Their article reviewed research over the past decade of rapid readmission (defined as readmission that occurred with 30 to 90 days) and concluded that readmission should be considered an indicator of successful treatment for this specific group of readmissions. In their review, the authors reported studies that indicated more careful attention to and standardization of discharge planning, as well as attending to clinical stability before discharge, could potentially prevent or reduce rates of rapid readmission.

Readmission Predictors – Static and Modifiable

An extensive amount of literature has examined various factors to determine which one is associated with hospital readmissions. This is due to international trends which have shifted from psychiatric institutions with long hospital admissions, toward acute short hospital stays supported by community-based after care (Behr, Christie, Soderlund, & Lee, 2002). The managed health care models in the United States, and the shift from long-term mental health institutions to community-based care, has put greater emphasis on ways to decrease hospital lengths of stay (Sullivan, Welles, Morgenstern, & Leake, 1995). Related to this shift, Geller, Fisher, McDermeit, and Brown (2000) noted it was getting harder to be admitted to a state hospital in the United States for the first time than it was previously, and yet at the same

time the number of patients who had multiple admissions was increasing. The general decline in number of hospital beds and mental hospital population size seemed to parallel an increasing rate of readmissions for subgroups of psychiatric patients (Appleby, Luchins, Desai, Gibbons, Janicak, & Marks, 1996).

When readmission numbers are high, it is generally interpreted as an indicator of poor treatment (Banks et al., 1998). Readmissions, specifically rapid or frequent readmissions, are costly and disruptive to a patient's life and consume time for the multidisciplinary teams charged with treating these patients. This situation has led to a plethora of research studies that try to identify factors that can predict and potentially prevent readmissions; a goal that is considered beneficial to patients, hospitals, and budgets (NASMHPD, 2015).

Unfortunately, the literature on readmissions to hospitals for psychiatric care offers conflicting findings and provides an inconsistent picture of the reasons for readmissions. This is due to variations in definitions of readmission, non-standardized descriptions of the study populations, inconsistent settings, variations in what factors are being measured, and the inclusion of variables that have limited rationale for their degree of influence on readmissions (Espadas, 2005; Hall, 2011; Hillman, 2000; Holsten, 2011). Despite these limitation issues, a few predictors of readmissions have been identified (Vogel, & Huguelet, 1997).

Klinkenberg and Calsyn (1996) conducted a comprehensive review of research predicting receipt of aftercare and recidivism (rehospitalization) among individuals with severe and persistent mental illness. Their review was of literature written in the 20 years between 1974 and 1994 and classified predictor variables into three categories; 1) patient strength and vulnerability, 2) community support, and 3) system responsiveness. The patient strength and vulnerability category included static factors such as; socio-economic,

demographic, clinical and diagnostic characteristics. They found no relationship in the articles among occupational status, employment status, educational level, or marital status; and inconsistent findings among race, gender, and age variables, regarding the ability of any of these variables to predict readmission. The clinical and diagnostic characteristics examined included, diagnosis, global level of functioning (GAF), and medication compliance; all of which showed mixed predictive results. The only variables with some significant findings were (a) medication compliance was associated with lower rates of readmissions, and (b) the number of previous admissions predicted a small amount of variance in the reviewed studies.

Community support variables such as living situation and social supports were also reviewed by Klinkenberg and Calsyn (1996). Due to inconsistences in the studies they reviewed, they determined it was unclear if living situation was a predictive factor in readmissions. They concluded that patients who are readmitted more frequently had smaller social networks, and higher levels of family conflict.

System responsiveness referred to factors that facilitate or impede a patient's ability to navigate the community mental health care system within a reasonable amount of time following psychiatric hospital discharge. System responsiveness also included organizational and system factors such as hospital policies, admission criteria, case management, aftercare programs, and alternative treatment resources to reduce hospitalizations (Grusky et al., 1986). While case management has been cited as an important tool in prevention of readmission, there were not enough studies at the time of Klinkenbery and Calsyn (1996) review to draw any conclusions about its effectiveness in reducing readmission rates.

Klinkenberg and Calsyn's (1996) study concluded that findings in past research should be regarded as tentative because of methodological and theoretical weaknesses. They

commented that multivariate statistics were rarely used and many of the studies were based on non-representative samples, plus interactions between patient-level variables, community support, and system responsiveness variables were rarely studied. In addition, much of the research they reviewed was based on archival data, resulting in the choice of variables studied was more guided by data availability rather than by theory.

"Static" or Non-Modifiable Predictors of Readmissions

The following section reviews additional literature considering whether factors studies were "static" so "non-modifiable", or whether they are "modifiable" predictors that can be used to reduce hospital readmissions.

Static factors. Studies examining static or non-modifiable factors associated with, or predictive of readmission generally describe a sub-group of patients who are readmitted within a certain timeframe, then compare them to the patients who are not readmitted; with the aim being to identify unique characteristics of the readmission patients that might be predictive of their future readmissions. Static factors that might be predictive of readmission include; demographic, socio-economic status, educational level, socio-cultural ethnicity, and personal social variables like marital and relationship status; as well as clinical factors that include diagnosis, age of onset, number of previous admissions, and (in the United States) payor status. Static factors can provide effective risk assessment considerations (Ramírez García, et al., 2004); however, they are not malleable to hospital clinical interventions.

Klinkenberg and Calsyn's (1996) review of 20 years of research findings, found that researchers identified a variety of relationships between numerous factors, but had not found a singularly predictive relationship between specific variables that evidenced increased

likelihood of hospital readmissions. Depending on the population studied, the studies identified clusters of variables or factors that provided descriptions of patient populations that potentially had greater chances of readmissions, but no factors with a singularly significant causal relationship. An example is the Mojtabai, Nicholson, and Neesmith (1997) study that examined several demographic personal and social resources, as well as psychiatric variables. They learned the patients' diagnosis, length of initial hospitalization, and level of functioning at time of discharge, including interaction of employment status, living status, age and living status, were all significantly related to readmission rates (Mojtabai, Nicholson, & Neesmith, 1997).

Demographic, socio-economic, socio-cultural, and family. A wide range of demographic, socio-economic, socio-cultural, and family status variables or factors have been examined as static predictors of readmissions. Some of the factors commonly researched are:

Demographic factors such as, **gender** (Appleby et al., 1996; Casper & Donaldson, 1990; Colenda & Hamer, 1989; Kastrup, 1987; Kolbasovsky, et al., 2007; Marsh, D'Aunno, & Smith, 2000; Marsh, Cao, & Shin, 2009; Perlick, et al., 1999; Tansella, Micciolo, Biggeri, Bisoffi, & Balestrieri, 1995; Thompson, Neighbors, Munday, & Trierweiler, 2003), and **age** (Casper & Donaldson, 1990; Colenda & Hamer, 1989; Kastrup, 1987; Kolbasovsky, et al., 2007; Lewis & Joyce, 1990; Monnelly, 1997; Perlick, et al., 1999; Thompson, et al., 2003); as well as **family or marital status** (Behr, Christie, Soderlund, & Lee, 2002; Bernardo & Forchuk, 2001; Kastrup, 1987; Kolbasovsky, et al., 2007; Monnelly, 1997; Ramírez García, et al., 2004).,

Socio-economic factors such as, **employment status** (Clements, Murphy, Eisen, & Normand, 2006; Moran, et al., 2000; Schmutte, Dunn, & Sledge, 2009; Tansella, et al., 1995),

and **level of education** (Blankertz, 2001; Ramírez García, et al., 2004; Thompson, et al., 2003); plus - **Socio-cultural factors** such as, **ethnicity** (Marsh, Cao, Guerrero, & Shin, 2009; Ramírez García, et al., 2004; Thompson, et al., 2003); and **housing and living in larger cities** (Kastrup, 1987; Sullivan, Wells, Morgenstern, & Leake, 1995).

The following section explores demographic, socio-economic, socio-cultural, and clinical factors by reviewing studies that confirmed some of these factors have demonstrated an influence on readmissions, as well as studies that came to opposite conclusions.

Demographic Factors

Using Reddy's (2014) model; demographic factors or variables include, the community the patient resides in, their gender (sex), and their age.

Gender. Differences between males and females in terms of rehospitalization rates and risk for rehospitalization have been explored by several researchers, however gender as a risk factor has not generally proven to be significant on its own. Segal, Akutsu, and Watson (1998) reported no gender differences between involuntarily readmitted and non-readmitted patients within one year. Korkeila, Lehtinen, Tuori, and Helenius (1998) also reported no gender differences in readmission risk among Finnish psychiatric patients who had experienced multiple psychiatric hospitalizations. Swett (1995) observed similar patterns of rapid readmission between males and females. Comparable risks for rehospitalization for men and women were also observed by Haro, Eaton, Bilker, and Mortensen (1994) after they adjusted for the age of onset of psychiatric illnesses.

The fact that gender was not a specific factor in psychiatric readmission rates was confirmed by a number of researchers (Boydell, Malcolmson, & Sikerbol, 1991; Citrome,

Green, & Fost, 1994; Owen, Rutherford, Jones, Tennant, & Smallman, 1997; Perlick, et al.,1999; Pillay, du Plessis, Vawda, & Pollock, 1994; Postrado & Lehman, 1995; Russo et al., 1997; Vogel & Huguelet, 1997; Walker, Minor-Schork, Bloch, & Esinhart, 1996). All included gender as a factor in their analyses, and none found gender differences in hospital readmission rates at two months, three months, six months, 12 months, 18 months, 24 months, 15, or 36 months following discharge.

Gender as a factor in substance use treatment showed that women have less access to mental health services, and when they do go into treatment they present with more serious health and social problems than men (Marsh, D'Aunno, & Smith, 2000; Marsh, Cao, & Shin, 2009). The Marsh, Cao, and Shin (2009) study found that women who had their service needs (housing, transportation, child care, and outreach) met by the treatment program were more likely to stay in treatment and less likely to relapse within the 6-month period studied. The service they examined also found if women who had a co-occurring mental illness and substance-abuse problem were placed in long-term treatment facilities that allowed their children to stay with them, the women were more likely to engage in the program. However, Marsh, Cao, and Shin concluded that a number of predictors about participation in treatment need to be considered and tailored to the individual to improve treatment compliance. These included the women's age, race, education, employment status, being pregnant or having minor children, and the number and type of services received, such as transportation, vocational training, and housing (Marsh, Cao, & Shin, 2009).

Age. Several studies included age as a factor in their research (Casper & Donaldson, 1990; Colenda & Hamer, 1989; Kolbasovsky, et al., 2007; Thompson, et al., 2003), but did not evidence statistical differences in rates of readmissions due to age. The studies did not

indicate initial admission sites; e.g. child or adolescent psychiatric, or pediatric wards, in the indicators. Four studies found younger ages were associated with an increased risk for readmission. Kastrup (1987) found that revolving door patients were younger than others, single or divorced, and lived in larger cities. Kastrup noted that high risk groups were 15–24 years old, with 21% of the young males and 13% of the young females became revolving door patients. Lewis and Joyce, (1990) found patients who were younger and had a psychotic diagnosis had an increased likelihood of becoming a revolving-door patient. Their stepwise logistic regression showed that younger age and psychotic diagnoses were associated with a high probability of becoming a revolving-door patient. Monnelly (1997) reported that military veterans who returned to a hospital within 30 days of discharge were approximately five years younger than those not readmitted. Perlick, et al. (1999) also reported younger ages were associated with an increased risk of readmission for a sample of individuals with bipolar disorder who were readmitted within a 15-month period.

Socio-Economic Factors.

Following Reddy's model (2014), socio-economic factors include a patient's employment status and education achievement. In addition, family status and living arrangements (such as homelessness), have been studied as potential static factors that might be predictive of readmissions. Perlick, et al. (1999) did not find that socio-economic status was predictive of readmission; however, some studies found a relationship between unemployment and homelessness with an increased risk for readmission.

Employment. In their examination of one-year hospital readmission, Clements, Murphy, Eisen, and Normand (2006) found the patients more likely to be readmitted were less

likely to be employed at the time of admission. Moran, et al. (2000) also reported that patients who were rehospitalized within a 15-month period were less likely to be employed or hold a steady volunteer position. Schmutte, Dunn, and Sledge (2009) reported unemployment had an independent effect on number of hospitalizations in a matched control study of patients with recurrent psychiatric hospitalizations.

Education. Ramírez García, et al. (2004) found a higher level of education was a risk factor for rehospitalization for Americans with a European heritage, but not for Latino ethnicity. Blankertz (2001) found level of education and type of career were two important cognitive components of self-esteem, mastery, and overall functioning for individuals with severe mental illnesses. Other studies confirmed that limited literacy and mental illness commonly co-occur. Colton and Manderscheid (2006) found that 54% of patients in urban psychiatric clinics had limited literacy skills, one of many factors for mental health patients having a higher relative risk of death than the general population. Sentell and Shumway (2003) reported a nationally representative sample in the United States showed 75% of adults with a self-reported mental health problem had limited literacy skills.

Housing and Living Arrangements. Yamada, Korman and Hughes (2000) looked at a variety of housing options for patients who were discharged to the community as to their risk and length of time before hospital readmission. They found housing factors had a powerful effect on patients having fewer readmissions if they were assigned to some form of supported residential program, compared to if patients lived on their own. For example, patients who were discharged to live with a parent or relative, in a group home, or in a supported housing environment, had 0.45 likelihood of returning to the hospital, in comparison to patients who were to live in their own house or apartment. Patients discharged

to live in a nursing home or personal care home had 0.63 of the likelihood of returning to the hospital compared to patients discharged to live in their own house or apartment. Patients who were discharged to jail had 0.55 the risk of return as patients discharged to live in their own house or apartment. However, some living arrangements such as a boarding home, hotel, or shelter did not differ from those discharged to live in their own house or apartment in terms of the likelihood of returning to the hospital (Yamada, Korman, & Hughes, 2000). Based on these findings, the authors suggested a fundamental requirement in the management and rehabilitation of persons with severe and persistent mental illness was to have a supportive and structured living arrangement, and other interventions are of little benefit until people feel secure and are stabilized in their living situations. The researchers concluded an individual's residence with appropriate structure and support may be the greatest factor in a successful and prolonged stay in the community (Yamada, Korman, & Hughes, 2000).

Homelessness. Being homeless is a risk factor associated with a greater likelihood of readmission. This was confirmed in a sample of Veterans Administration patients who had a serious mental illness (SMI) over the seven-year period in the study by Irmiter, McCarthy, Barry, et al. (2007). A related study by Banta, Wiafe, Soret, and Holzer (2008) was conducted in California to find areas that had a greater proportion of indigent psychiatric hospitalizations. This research revealed individuals living 200% below the poverty level had fewer resources allocated to their communities. Stein, Dixon, and Nyamathi, (2008) study also found that people who were homeless often lived in neighborhoods with the fewest resources, limited opportunities, and high rates of crime and violence. Being chronically homeless, living in substandard housing, and having unstable housing were all associated with

more drug and alcohol use, and use of intravenous drugs at greater rates than the general population (Stein, et al., 2008).

Socio-Cultural Factors

Ethnicity or race. Ramírez García, et al. (2004) found the ethnicity of the patient made a difference in readmissions in an American study. They looked at Latino ethnicity compared to a European background in predicting rehospitalization to a state psychiatric hospital in an urban southwestern town, and found Americans with a European background had a higher risk factor for rehospitalization than Latinos. Another American study by Yamada, Korman, and Hughes (2000) noted that demographic factors had little impact on significant differences in survival expectancy, except for race. Their patient data was equitable with African Americans (47%) and Caucasians (53%) being included in the study; but found Caucasian patients median survival time in the community was more than twice that of African Americans (617 days versus 307 days before rehospitalization), stating this difference was noteworthy (Yamada, Korman, & Hughes, 2000).

Thompson, et al. (2003) study also included racial or ethnic factors, but found patients with a European background were twice as likely as African Americans to receive a referral to aftercare services, and concluded ethnicity was not clearly related to rehospitalization rates. They found racial effects were ambiguous because race is usually strongly related to socio-economic factors such as financial factors, educational background, and health care insurance status. Their study suggested the possibility of racial disparities in referrals to aftercare and a complex relationship between referral and rehospitalization. They concluded the concept of race has been questioned as to its validity, and suggested their findings warrant further

investigation with attention to individual-level indicators of need, system-level barriers, and facilitators of psychiatric care.

In Auckland, New Zealand, a 5-year follow-up study was conducted using hospital admissions of 924 patients extracted from electronic records. Relevant demographic information (gender, age, and ethnicity) and clinical data (primary diagnosis at index admission and admission history) were included for each person. The study found patients who experienced higher numbers of readmission in the 5-year period after the index discharge were more likely to be Māori (Indigenous) whose number of hospital admissions were 1.37 ratio compared to Europeans at 1.0. They noted literature that explores Māori experiences of acute mental health services has highlighted gaps and concerns, and concluded this disparity in hospitalisation rates emphasizes the need for further investigation into how acute mental health services can more effectively meet the needs of Māori and improve outcomes (Wheeler, Moyle, Jansen, Robinson, & Vanderpyl, 2011).

Family Status

Marital status. In a nation-wide longitudinal cohort study in Denmark, Kastrup (1987) found that "revolving door" (a minimum of four admissions) patients were younger than other patients, and were either single or divorced, and lived in larger cities. In support of a patient's marital status being associated with rapid and recurrent admissions to hospitals, Behr, Christie, Soderlund, and Lee's (2002) South African study of 284 admissions, found the only factor that provided a statistically significant protective effect for readmissions was being married or cohabiting compared to being single. They noted this finding was in contrast to findings of other researchers (Appleby, et al., 1993; Mortensen & Eaton, 1994; Solomon,

Gordon, & Davis, 1984; Vogel & Huguelet, 1997) who had concluded that data from hospital and community agency records indicated that neither social-demographic nor clinical characteristics successfully differentiated psychiatric readmissions from non-readmissions. Given this, Behr, Christie, Soderlund, and Lee (2002) hypothesised that the ability to maintain a partnership may indicate less severe illness, or that a cohabiting partnership in the community conferred a protective effect by virtue of support and help from family structures.

This hypothesis could align the findings of a Canadian study by Bernardo and Forchuk (2001) at a tertiary psychiatric hospital in Ontario that examined patient-related factors associated with readmission. The researchers reviewed a random sample of 200 patients from an index discharge date in 1991 through subsequent rehospitalizations over the next three years. Their sample found the majority of the psychiatric patients (78 percent) did not have a partner and were either single, separated, divorced, or widowed; however, the researchers found the only variable that significantly differentiated patients who were readmitted from those who were not readmitted was if the patient had a history of hospital admissions (Bernardo & Forchuk, 2001). A recent American study by Ortiz (2019) was based on a national sample and looked at predictors for 30-day post-discharge readmissions to multiple USA state hospitals. The researcher found the factors that were significantly related with rapid readmission included being white (odds ratio, 1.23), non-Hispanic (1.48), not married (1.53), the hospital length of stay, and having schizophrenia or other psychotic disorders (1.69) (Ortiz, 2019). Similar to other studies, “not married” did not differentiate between being single and never married, compared to divorced or separated.

Community and family support. In their review of research articles published between 1974 and 1994, Klinkenberg and Calsyn (1996), in addition to socio-demographic

factors, also reviewed studies on community support variables such as living situation and social support. Due to inconsistencies in the literature's findings, the authors determined it was unclear if living situation was a predictive factor for readmission. However, their review concluded that patients who were readmitted frequently, usually had smaller social networks, plus higher levels of family conflict and expressed emotion. Related to this, if patients' families received educational interventions, then fewer hospitalizations occurred.

Clinical Factors

Clinical factors such as; childhood age of onset of psychiatric illness, premorbid level of functioning, chronicity, or severity of symptoms at admission, plus diagnosis (schizophrenia and psychotic disorders), as well as co-occurrence of substance-related disorders, have been researched as potential predictors of readmission (Sayre, 2000). Clinical factors are considered static as they are historic or part of a person (e.g. age of onset). However, a patient's symptom severity or level of instability at time of hospital discharge, and their number of previous hospitalizations could be considered modifiable factors, as it has been hypothesized that effective hospital interventions should ameliorate symptoms prior to a patient being discharged.

Childhood age of onset. A person's childhood age for onset of a psychiatric illness as a predictor for increased likelihood of readmission has conflicting findings. Bobo et al. (2004) identified several clinical and demographic variables to determine how they correlated to readmissions at a tertiary military psychiatric inpatient hospital. They found that 14% of the patients had readmissions, and they accounted for a disproportionate number of inpatient days. Having a history of childhood psychiatric problems (onset before age 18), was one of

the strongest predictors for patients who had two or more admissions over a 13-month period in their sample of military veterans. The patients usually had a background of childhood psychiatric problems, previous psychiatric hospitalizations, current or past substance abuse, legal problems, and psychotic or non-bipolar mood disorders. Bobo et al. (2004) found the two most statistically significant factors to be, 1) past psychiatric hospitalizations, and 2) the age of onset for childhood psychiatric problems. In contrast, Rea et al. (2003) did not find that age of onset was associated with rehospitalization over a 2-year period (treatment and follow-up) when looking at a sample of patients with Bipolar I who were recently hospitalized.

Premorbid functioning. A person's level of premorbid functioning was demonstrated in several studies to be a predictor for increased likelihood of readmission. Lyons et al. (1997) reported that premorbid level of dysfunction was predictive of readmission within one year in a study examining readmission as an indicator of negative hospital outcome. Similarly, Rea at al. (2003), in their study on the impact of family therapy on relapse and readmission for individuals with bipolar disorder, reported that poor premorbid adjustment was predictive of readmission during a post-treatment follow-up period of one year. However, this study also reported that during the one-year treatment period, patients who received family therapy were less likely to be readmitted regardless of premorbid levels of adjustment.

Chronicity or severity of symptoms at admission. Coleman et al. (2007) looked at level of premorbid functioning, as well as chronicity in their study on the impact of staff attention on post-discharge "community tenure" (lack of rehospitalization). They found that higher levels of premorbid competency and lower levels of chronicity were predictive of

longer community tenure (fewer readmissions) even with reduced staff attention. In the group with higher rates of staff attention, premorbid competency did not predict community tenure at any level of chronicity. Their findings were that increased staff attention benefitted all patients, even those with higher levels of chronicity, but in general patients with lower levels of chronicity had longer periods of community tenure.

Diagnostic Factors

Studies that examined diagnoses to predict readmission have produced mixed results as a diagnosis is not the same as its severity. Many studies that examined the likelihood of patient readmissions utilized samples of patients who had been hospitalized in the past. The inherent bias in this is patients admitted to specialized psychiatric inpatient facilities typically have serious and persistent mental illnesses (schizophrenia, psychotic, or affective disorders) which include most diagnostic categories for which patients can be hospitalized. A confounding factor for the findings regarding each mental health diagnostic cluster was whether patients had co-morbid substance use issues.

Schizophrenia. Thompson, et al. (2003) looked at psychotic disorders, but viewed differentiated schizophrenia and schizoaffective disorder as separate categories, and reported those with schizoaffective disorder were almost twice as likely to be readmitted as those with other schizophrenic disorders. When looking for causes and patterns of hospital recidivism in individuals diagnosed with schizophrenia, the most common reasons recorded were medication non-adherence (Weiden & Glazer, 1997). This is possibly because hospitalizations only address acute episodes, and do not allow for patients to become stabilized on a therapeutic dose of medication prior to discharge (Weiden & Glazer, 1997).

Psychotic disorders. Schmutte, et al. (2009) reported psychotic disorders at the initial admission had an independent effect on the number of admissions over a period of 48 months (24 months prior to initial admission, and 24 months post admission) in that psychotic disorders were more likely to be readmitted than "other disorders," or non-psychotic affective disorders. The study also found patients with more admissions were likely to also have a substance abuse disorder, but this was not independently predictive of number of readmissions.

In a report on characteristics of repeat users of inpatient psychiatry at a United States military hospital, Bobo et al. (2004) reported the presence of psychosis, or non-bipolar mood disorder, was predictive of readmission over a 13-month period, with bipolar disorder having a significantly lower risk of readmission. They found that co-morbid substance abuse or personality disorder was not predictive of readmission; however, a history of substance abuse was predictive.

Depressive disorders. Kolbasovsky et al. (2007) reported a diagnosis of depression was predictive of an increased number of hospital days used in a 12- month period following initial admission; and found that substance abuse was not a statistically significant predictor in their study. Hendryx et al. (2003) had the opposite findings. They found diagnoses were not predictive of readmission during a one-year follow-up period, although a secondary substance abuse diagnosis was predictive. However, Hendryz et al. (2003) commented the sample sizes were too small to demonstrate statistically significant findings. When they used diagnosis dependent regression models, they found specific predictors were diagnosis dependent. Their study reported rehospitalization rates varied significantly by diagnosis, with schizophrenia being the most likely diagnostic group to be readmitted, and depression being the least likely.

Co-occurrence of substance-related disorders. Haywood, Kravitz, Grossman, Cavanaugh Jr., Davis, and Lewis (1995) studied a subpopulation of chronically mentally ill patients who were frequently readmitted to psychiatric units. They examined statistical relationships between demographic features, diagnostic characteristics, and frequency of hospitalization of patients from four state hospitals. Their conclusion was alcohol and/or drug problems, plus noncompliance with medications, were the most important factors related to frequency of rehospitalization. Sullivan, Wells, Morgenstern, and Leake (1995) had similar findings that medication noncompliance, comorbid alcohol abuse, and a high level of criticism of the patients by family members, were all associated with a greater risk of rehospitalization. However, Sullivan et al. (1995) also found that types and extent of outpatient service use, access to aftercare, quality of life, and demographic variables (other than ethnicity and gender) were not associated with rehospitalizations.

In most diagnostic categories, individuals with co-occurring mental illness and substance use had higher rates of readmission than those without. Several studies found that readmission rates were higher across all diagnosis categories for the subset of individuals with dual diagnosis, or co-occurring substance-related disorders (Appleby, et al., 1996; Kastrup, 1987; Lewis & Joyce, 1990; Tansella, et al., 1995). Studies continue to confirm that patients with co-morbid diagnoses of substance abuse have significant risk of psychiatric rehospitalization (Irmiter, et al., 2007; Madi, et al., 2007; Schmutte, et al., 2009). Minkoff (2001) recognized this, stating when mental illness and a substance use disorder coexist, each disorder should be considered as primary, and integrated dual primary treatment should be provided; the treatment for each disorder should be matched to the diagnosis and the stage of change. His integrated model assumes co-occurring disorders require mental health and

addiction treatment services to have competency in both diagnostic areas to treat the co-morbidity.

Symptom severity at admission. Several studies examined level of functioning or severity of symptoms at time of hospital admission as potential predictors of readmission, but with conflicting findings. In a study examining the power of administrative data compared to clinical variables in predicting rehospitalization, Hendryx et al. (2003) reported that clinical variables improved prediction significantly compared to only administrative or demographic variables. This study found the patient's Global Assessment of Functioning (GAF) at admission was predictive of rehospitalization within one-year post discharge. However, the authors noted problems using the GAF score, such as poor inter-rater reliability, and noted the clinical raters for their study had to be periodically recalibrated during the research on using the GAF score, which may have helped the predictive power in their study.

Lyons et al. (1997) administered a "Severity of Psychiatric Illness" (SPI) scale with patients at the time of admission to assess severity of symptoms in a managed care program. The SPI scale has several domains, including level of self-care, impairment, and severity of symptoms. In their study higher levels of symptom severity were reported for patients who were readmitted within six months up to one year. For patients who were readmitted within three months, only a higher level of impairment in the self-care subscale was significant. Despite some prediction findings in a few studies, other studies reported no differences between level of functioning, or severity of symptoms, with an increased likelihood of readmission. Monnelly (1997) did not find any predictive value of GAF scores at time of admission in his study of early readmission of a group of military veterans. Monnelly's study

also reported the Outcome Questionnaire-45 (OQ) scores were virtually the same at the second admission as they were at the first admission.

More recently, a Canadian study examined readmission factors and tested interventions to reduce early psychiatric readmissions, with the aim of creating a risk index to predict readmissions. The risk assessment model (READMIT) that Vigod et al. (2015) developed was found to only have moderate discriminative capacity because of the large number of events in the community that could occur after discharge could modify risk for readmission, by either reducing or increasing it. Being hospital focused on a specific sub-population limited the number of factors that could be considered, resulting in the READMIT tool having limited discriminative functions.

Hospitalization Factors

Previous hospitalizations. The most cited and research supported static predictor for readmission is whether a patient was previously hospitalized. Klinkenberg and Calsyn's (1996) literature review found one variable with significance in reducing the rate of readmission was the number of previous hospital admissions as an indicator to predict readmissions, although there was a small amount of variance on its accuracy. Research conducted since then generally supports that patients who were previously hospitalized are more likely to be hospitalized in the future (Bobo, et al., 2004; Clements, et al., 2006; Coleman, et. al., 2007; Green, 1988; Hendryx et al., 2003; Kolbasovsky, et al., 2007; Monnelly, 1997; Moran, et al., 2000; Perlick, et al., 1999; Postrado & Lehman, 1995; Ramírez García, et al., 2004; Schmutte, Dunn, & Sledge, 2009; Thompson, et al., 2003).

"Modifiable" Factors

Most studies on predictors of readmission have focused on static or non-modifiable factors with conflicting findings. While static variables provide interesting descriptive information, they are generally independent factors that cannot be intervened with to reduce readmissions. In comparison, modifiable factors could potentially relate to readmissions and may be malleable if suitably identified, or impacted by clinical or policy changes in the hospital environment to potentially reduce rates of readmission.

Modifiable risk factors. Morgan, Korten, and Jablensky (2006) found relatively little research had been published on modifiable factors, compared to static factors, when looking at risk factors for rehospitalizations of serious mental illness. They noted the earlier work of Sullivan et al. (1995) and (1997) as being exceptional with modelling five groups of modifiable risk factors; health beliefs and behaviours, utilization of health-care services, home environment, barriers to care, and satisfaction with life. A small number of studies examined modifiable factors related to hospital readmissions for mental health or substance use reasons. Other potentially modifiable factors include; length of hospitalization stay, therapeutic involvement in treatment, family involvement in treatment, instability at time of discharge, number of days until community follow-up care occurs, transition planning, discharge disposition, and medication compliance.

Vulnerability and protective factors. One study that specifically examined modifiable variables was Sullivan et al. (1995) which applied a theoretical rationale to their investigation. They used a "vulnerability" or "stress" model of serious mental illness applied to the health care problem of readmissions. Their model hypothesized that severity of symptoms resulted from an interplay of vulnerability factors, behaviourally protective factors, stressful

environmental factors, and preventative coping factors. The authors found that medication noncompliance, co-morbid alcohol abuse, and family rejection were all risk factors for readmission, while the types and extent of outpatient service usage, access to care, and quality of life were not risk factors.

A second hypothesis-driven analysis by Sullivan et al. (1997) found highly disruptive or dangerous behaviours (e.g. bizarre behaviours, threatening others, attempted suicide) were strong predictors of rehospitalization, and were more powerful than clinical risk factors such as medication non-compliance and alcohol abuse. They suggested it may be possible for service providers to avert fiscal and emotional costs of hospitalization by collaborating closely with family members to identify disruptive behaviors and intervene before hospitalization becomes unavoidable (Sullivan et al., 1997).

Suicide risk. Reporting on suicide attempts in Canada and other countries, is challenging and subject to underreporting (Skinner, McFaull, Draca, Frechette, Kaur, Pearson, & Thompson (2016). Canadian studies regarding Northern and remote regions evidence more challenging and complex mental health and social issues, which include higher rates of suicide and hospitalizations (Labonte, 1999; Latkin & Curry, 2003). Canadian hospitalization data estimates for 2010 indicate around 16,000 hospital separations associated with self-inflicted injuries occurred, creating economic costs for suicide and self-harm estimated at $3 billion (Skinner et al., 2016). Skinner et al. (2016) found the trend for Canadian completed suicide rates for all ages decreased from 14.4 per 100,000 in 1979, down to 10.4 per 100,000 in 2012. However, this trend was not observed for both sexes; completed suicide rates were higher among males, while hospitalizations for self-inflicted injuries were predominantly females (Skinner et al., 2016).

Symptom severity at discharge. Moran, et al. (2000) examined potentially modifiable variables in their study of predictors of readmission to a general hospital psychiatric unit. In their study of 370 patients admitted over a 15-month period, the authors reported no differences in symptom severity or relief at discharge between readmitted and non-readmitted groups. They also reported no differences in the length of stay (LOS) between the two groups; however, they did report that patients more likely to be readmitted were involved in out-patient day treatment programs. They thought this contradictory finding might be the result of patients attending day treatment being more likely to come to the attention of service providers as requiring rehospitalization, compared to former patients who were not involved with service providers on a regular basis after discharge.

Moran, et al. (2000) also reported no difference in patients' reported levels of symptomatic distress when readmitted within 30 days, versus those readmitted after longer intervals, or when comparing the group of readmitted compared to the group of patients who were not readmitted. Symptom severity or distress was assessed in this study by completion of Outcome Questionnaire-45 at admission and at discharge.

Another study that examined symptom severity, Clements, et al. (2006), looked at both patient self-report data as measured by the Behaviour and Symptom Identification Scale 32 (BASIS-32), as well as clinician rating with the Global Assessment of Functioning (GAF) to predict hospital readmission for a group of psychiatric inpatients. The authors reported that the patient self-report using the BASIS-32 scores, was a better predictor of one-year hospital readmission than the clinician ratings using the GAF scores. However, while the BASIS-32 was better at predicting one-year admissions, neither the BASIS-32 nor the GAF had positive predictive value when used as the sole predictor of readmissions.

Hospital effectiveness. Lyons, et al. (1997) examined hospital effectiveness as a predictor of readmission for a series of 225 patients consecutively admitted to several hospitals in a regional managed care program. The authors reported that while the clinical scores at admission were higher for the readmitted group than the not readmitted group, no differences in acuity scores (Acuity of Psychiatric Illness Scale) at discharge between the two groups were noted. They found patients with greater impairment in self-care, more severe symptoms, and more persistent illnesses were more likely to be readmitted than other patients, and suicidal patients were less likely to be readmitted. There was no evidence to suggest that poor hospital outcome or premature discharge was associated with readmission either within 30 days or within 6 months. They concluded that although patients at risk for hospital admission can be identified, it does not appear that the success of the hospital intervention per se influences the likelihood of readmission, and that the use of readmission rates as quality indicators for hospital care providers was not recommended.

Length of hospital stay. Two additional studies also reported no difference in the length of stay (LOS) when comparing non-readmitted to readmitted patients (Irmiter, et al., 2007; Thompson, et al., 2003). While these studies concluded that length of stay is not associated with an increased risk for readmission, another study reported a significant finding for length of stay and readmissions. Kolbasovsky, et al. (2007) reported the length of stay for the initial admission was predictive of a readmission occurring, when they reviewed the number of hospital days utilized in the 12-month period following an initial hospitalization.

Tansella et al. (1995) had a similar finding in their 10-year longitudinal study in Italy using survival analysis methodology. They found the duration of the hospital episodes of care increased consistently from the first to the fifth episode, and the probability of opening a new

episode of care after the first one increased consistently from the second to the sixth episode. The only variable they found significantly associated with the length of the first episode of care was diagnosis (longer episodes for schizophrenic patients) (Tansella et al., 1995).

Instability prior to discharge. Instability was noted to be a potential factor related to increased risk for readmission. Monnelly's 1997 study of men with an unplanned readmission to a Veterans Administration hospital within 30 days of discharge from initial stay, reported that instability prior to discharge was a significant predictor of readmission. This study looked at several modifiable factors that included; length of stay, Global Assessment of Functioning (GAF) score at discharge, quality of treatment plan, adequate living arrangements, discharge plan specified if treatment goals had been met, instability prior to discharge (defined as use of when necessary medications, restraints, seclusion, or close observation within three days prior to discharge), active psychotic behaviour, assault, or suicidal gesture or attempt within five days of discharge. No differences were found in readmitted and control groups for length of stay and treatment goals being met. While differences were noted with Global Assessment of Functioning (GAF) scores at discharge and increased instability prior to discharge, only instability prior to discharge statistically predicted readmission.

Discharge planning and post-hospital care. Hospital readmission rates for mental illness have been linked with the adequacy of discharge planning, and transition services to community supports (Steffen, Kösters, Becker, & Puschner, 2009). Stickney, Hall, and Gardner's (1980) study of four referral procedures of 400 patients discharged from a geographically distant hospital who were referred to a community mental health centre for aftercare, suggested that simple changes in hospital discharge systems could increase

compliance of patients and reduce recidivism. One change was scheduling a specific follow-up appointment for a patient, which significantly increased compliance with aftercare referrals. Engagement was increased and the recidivism rate was reduced by half, when the patient was seen by the community mental health aftercare nurse before discharge, and was given a specific follow-up appointment with that nurse.

Nelson, Maruish, and Axler (2000) examined whether patients discharged from inpatient psychiatric care would have lower rehospitalization rates if they kept an outpatient follow-up appointment after discharge. Their study looked at the association between discharge planning which included scheduling an outpatient appointment, and readmission rates at intervals of 90, 180, 270, and 365 days. This study is important given the shift from reliance on inpatient care to treatment in community settings. According to Nelson et al. (2000), a readmission rate of less than 15 percent within 30 days is the industry standard for quality of care; however, the authors evaluated readmission rates for periods up to one full year after discharge to determine the long-term impact of discharge planning. In this study, 542 out of 3,113 patients, or 17.4 percent, were readmitted within one year of discharge (Nelson et al., 2000). The readmission rate for those that kept at least one appointment was 11 percent in comparison to 22 percent of those who did not keep an appointment (Nelson et al, 2000). Nelson et al. found patients who did not have an outpatient appointment after discharge were two times more likely to be rehospitalized in the same year than patients who kept at least one outpatient appointment. Aggregated annual rates indicated that patients who kept appointments had a one-in-ten chance of being rehospitalized, whereas those who did not had a one-in-four chance. The authors recommended assertive outreach for patients who fail to be compliant with discharge planning (Nelson et al, 2000). Several other studies also found

non-compliance with outpatient treatment to be a risk factor for readmission (Casper, Romo, & Fasnacht, 1991; Colenda & Hamer, 1989; Haywood et al., 1995; Marken et al., 1992; Polk-Walker, Chan, Meltzer, Goldapp, & Williams, 1993).

System responsiveness. Another category considered by Klinkenberg and Calsyn (1996) in their review of literature was system responsiveness. This was defined as a set of factors that either facilitate or impede an individual's ability to navigate the mental health system. This includes factors such as case management, aftercare programs, and availability of alternate treatment resources to hospitalization (e.g. day treatment programs). They noted that while case management is often cited as an important tool in the prevention of readmission, there were not enough studies at the time of their review to draw conclusions about the effectiveness of case management on reducing readmission rates.

Accessing outpatient services. The availability of and access to community and outpatient treatment services might make a difference in readmission rates. Romansky, Lyons, Lehner, and West (2003) examined factors related to psychiatric hospital readmission among children and adolescents who were wards of Illinois State Children and Family Services. They found significant enabling factors such as living arrangements, geographic distances, and post-hospital services made a difference in rehospitalizations for children and adolescents in the child welfare system. They concluded the prevention of readmission for this population must focus on community-based services. Solomon, Gordon, and Davis (1984) had a similar conclusion for adult patients in that the use of aftercare services, in terms of the variety available and their relevance to discharged patients' assessed needs, had the greatest influence on predicting the likelihood of readmission. However, Thompson, et al. (2003) had the opposite finding for adults, which was that having a referral to community

aftercare services significantly increased the risk of rehospitalization within six months of discharge; although the reasons for the referrals to aftercare varied depending on diagnosis and services available.

A Canadian study by Vasiliadis, Lesage, Adair, and Boyer (2005) took a different approach looking at community service use for mental health by examining provincial differences in rates, determinants, and equity of service access. They used Canada's 2002 national survey on mental health and well-being reporting, and questions on service use. The study found that while mental disorders may affect more than one person in five on average, most do not seek help. Vasiliadis, et al. (2005) learned there was almost a twofold difference between provinces in the types of services that were accessed for mental health care. Primary care physicians were the most widely used service; with the level of "need" being the strongest predictor of accessing services. However, socio-economic, and demographic variables played roles in accessing services in each province. Vasiliadis, et al. (2005) concluded that varying provincial attitudes toward mental disorders caused some of these variations in care-seeking when comparing health care jurisdictions across provinces.

Therapeutic interventions post-discharge. Specific therapeutic interventions post-hospital discharge was looked at in some studies as modifiable means to reduce readmission rates. The studies did not specifically look at interventions during the initial hospitalization, but demonstrated that focused interventions post-discharge can have a potential impact on readmission rates. Coleman et al. (2007) reported an increase in community tenure with an increase in staff attention even for patients with a poor prognosis. Taylor et al. (2005) evaluated an intensive post-discharge follow-up program that consisted of reminder calls for appointments, and interventions with patients who did not show up for the appointments.

They found this resulted in a decrease of readmissions from 2.85 per person in the 12 months before they started the intervention, down to 0.70 per person in the 12 months after the intervention.

Family therapeutic interventions. Several studies looking at this factor reported decreased rates of readmission with family therapy interventions (Rea, et al., 2003), acceptance and commitment therapy (Bach & Hayes, 2002), or skills training with family involvement (Kopelowicz, et al., 2003). These studies concluded that implementing community-based therapeutic interventions created conditions that were not typical for discharged psychiatric patients, which may have influenced the rehospitalization rates. Some of these therapeutic interventions and services included; 24-hour follow-up phone calls for appointment reminders, and interventions for no shows, a requirement that patients live with family members during the duration of the study, they take part in skills training groups four times per week for three months, participate in therapeutic intervention sessions, or receive one year of individual or family therapy, and one year of medication management, as requirements to be part of the studies.

Treatment engagement. A previously mentioned study, Ramírez García, et al. (2004) looked at modifiable variables in readmission research, in relation to ethnic differences in rates. The authors examined several modifiable factors such as; treatment engagement, social networks, and living arrangements post-discharge. They found that treatment engagement (defined as medication compliant and use of outpatient services), was the top modifiable predictor of readmission with no ethnic differences. They also reported an increased risk for readmission for patients who lived alone post-discharge, which was also not related to the patient's ethnicity.

Effectiveness of community treatment orders. Burgess, Bindman, Leese, Henderson, and Szmukler (2006) investigated whether community treatment orders (CTOs) would prevent readmissions to hospitals, as controlled studies had been inconclusive. They tested the hypothesis that hospital discharges subject to community treatment orders would be associated with a reduced risk of readmission. Burgess et al. (2006) used Australian data from 1992–2000 to examine 16,216 discharges subject to a community treatment order (CTO). They concluded the effect of using a community treatment order depended on the patient's history, and at a population level using CTOs might not reduce hospital readmissions.

Similarly, Kisely, Smith, Preston, and Xiao (2005) studied whether community treatment orders reduced psychiatric admission rates, or bed-days. They compared patients in Western Australia to patients in Nova Scotia. They also found compulsory community treatment did not reduce hospital admission rates, but thought the increased surveillance of patients on CTOs may lead to earlier interventions such as hospital admissions, but reduced the length of hospital stay. However, they did not know if this conclusion was due to the intensity of treatment or its compulsory nature. British Columbia's provincial Mental Health Act (1996), Section 37 is like Australia's in that it provides "Extended Leave" for compulsory community treatment, however no provincial study on this topic was located (British Columbia MOH, 2005).

Patient's adherence to medications. In their extensive review of research articles published between 1974 and 1994, Klinkenberg and Calsyn (1996) only found two variables with some significance in reducing rates of readmission, the main one being medication compliance. Not continuing with prescribed psychotropic medications was not unusual.

Lieberman et al. (2005) found that 74% of patients with schizophrenia discontinued their medications prior to 18 months due to intolerable side effects. Olanzapine was discontinued due to weight gain or metabolic effects, whereas perphenazine was discontinued due to extrapyramidal effects. Dinaker, Sobel, Bopp, Daniels, and Mauro (2002) also reviewed patients with treatment refractory illnesses, and found value in reassessing patients with long hospital stays (over five years) who had treatment refractory schizophrenia by giving them trials of new medications due to the inefficacy, or intolerable side effects of previous medications. The studies that included adherence did not describe types of medication education offered during the hospitalization as part of medication changes.

Specialized versus General Hospitals - Canada

One Canadian study examined readmission factors and tested interventions to reduce early psychiatric readmissions, with the aim of creating a risk index (READMIT) to predict readmissions. The University of Toronto research team was led by Simone Vigod (Women's College Hospital, Paul Kurdyak (Centre for Addiction and Mental Health), and Valerie Taylor (Women's College Hospital). They published three papers, two in 2013 and one in 2015, focusing on Ontario hospitals with inpatient psychiatric units.

The initial paper by Vigod, et al. (2013a) was a systemic review of literature on transitional interventions with adults who had been admitted to hospitals with a mental illness, where the focus was on readmissions. This paper was built on Durbin, et al., (2007) review of psychiatric readmission literature. Vigod, et al. (2013a) found up to 13% of psychiatric patients were readmitted shortly after discharge, and interventions that ensured successful transitions to community care may play a key role in preventing early readmission. The 15

studies they reviewed showed risk reductions of 13.6% to 37.0% for intervention components that had statistically significance. From this, Vigod, et al. (2013a) concluded that effective intervention components were: pre- and post- discharge patient psychoeducation, structured needs assessments, medication reconciliation and education, transition managers, and in-patient /out-patient service providers communication, all aspects that could reduce early readmissions.

The second paper by Vigod, et al. (2013b) used administrative data to identify patients discharged from psychiatric hospital inpatient units in Ontario during years 2008-2011. They compared mental health readmissions within 30 and 90 days of discharge that occurred at the psychiatric hospital where the patient had been discharged (within-hospital), to readmission rates that occurred by patients presenting at other hospitals in the Province. Including all the readmissions in the province showed 9.3% for 30-day readmissions, and 15.8% for 90-day readmissions. When only readmissions at the discharge hospital (with-in hospital) were counted, hospital readmission rates appeared one-third lower, 6.8% for 30-day, and 11.2% for 90-day time periods.

Vigod, et al. (2013b) found significant institution readmission variability across the Province. When patients from smaller-volume psychiatric hospitals were readmitted, they were less likely to be readmitted to the same hospital they were discharged from, compared with patients from larger-volume psychiatric hospitals. They concluded there is a high likelihood that multiple hospitals are involved in hospital-based care of people who require readmissions. Their study focused on Ontario hospitals with psychiatric units with psychiatrists and specialized staff, and did not include general hospitals that did not have psychiatric units.

READMIT tool. Vigod, et al. (2015) third study used administrative data from the same cohort of psychiatric patients in Ontario from 2008-2011 (2013b) to validate a clinical risk assessment index (READMIT) they developed to test predicting 30-day readmissions of patients discharged from hospital psychiatric units. The result was that Vigod, et al. (2015) had similar findings about risk factors for psychiatric readmissions as the Durbin et al. (2007) literature review had identified, which were; patients who were younger, had a forensic history, low family support, a severe mental illness, acuity of symptoms at admission or discharge, and were discharged against medical advice were risk factors. In addition, Vigod, et al. (2015) identified medical comorbidity as a risk factor, commenting the overall complexity of the patient was an important consideration when planning post-hospital transition to community care.

The risk assessment model (READMIT) Vigod et al. (2015) developed was found to only have moderate discriminative capacity because of the large number of events in the community that could occur after discharge could modify risk for readmission, by either reducing or increasing it. The risk index (READMIT) was implemented by hospital clinicians for patients they identified as high-risk. The clinicians conducted assessments based on patient's needs, which became part of the discharge plan; then determined whether resources and supports could be put in place for community follow-up care. The researchers acknowledged the limitation of the READMIT tool as a risk index, as it only flagged high-risk patients in the hospital who should receive services upon discharge, with the aim of reducing risk of readmission. Being hospital focused on a specific sub-population limited the number of factors that could be considered, resulting in the READMIT tool having limited discriminative functions.

Vigod, et al. (2015) proposed the development of a discriminative predictive model for all aspects of readmission merited attention, and concluded the inclusion of post-hospitalization variables, such as region-specific health services might improve the predictive capacity of a risk index, but found it would not be practical because they are not measurable by the hospital staff administering the tool, nor generalizable across communities. This is understandable given the variety of unknown factors that could occur post-discharge and influence early readmission, such as the availability and adequacy of community-based resources to support patients.

After Vigod, et al. (2015) development of the READMIT tool, a United States researcher (Roque, 2016) examined the tool's effectiveness using a descriptive retrospective research design. Working with a team (Roque, Findlay, Okoli, & El-Mallakh, 2017) data was extracted from discharge summaries for 1152 of the 2800 patients discharged in 2013 through 2014. The information included, patient demographic variables (age, gender, race/ethnicity, primary diagnosis, housing status at discharge, employment, long acting injectable at discharge, substance abuse, education, and insurance status), plus variables from the READMIT risk index (repeat admissions, emergent admissions, age, diagnosis and discharge, medical comorbidity, intensity, and time in hospital). The inclusion criterion was age 18 years and over, and no exclusion criteria.

Unfortunately, Roque, et al. (2017) determined the results were limited as they decided the 1152 sample records were not randomized making it impossible to conclude there were non-systemic differences between the patients derived for the sample compared to the patients who had not been included. Due to this the researchers did not use logistic regression to establish whether the READMIT clinical risk index was predictive of 30-day readmissions.

They did run Descriptive Frequencies and Chi-Square tests, which supported four potential risk factors (static or non-modifiable) that clinicians should be aware of related to 30-day hospital readmissions (e.g. number of previous readmissions, younger age, diagnosis, and having health insurance). They concluded by suggesting future research is needed to determine the utility of the READMIT clinical risk index score in evaluating patient needs for transitional care services post-hospital discharge, as well as the importance of conducting qualitative studies to gain patient perspectives on reasons for readmissions (Roque, Findlay, Okoli, & El-Mallakh, 2017).

Summary

As Behr, Christie, Soderlund, and Lee (2002) commented, inconsistent results from research studies have confirmed there is a world-wide difficulty in determining consistent and accurate predictors of psychiatric readmissions. Due to the range of factors that cannot be controlled in patients' lives when they return to the community after being discharged from a hospital, a large number have been examined, but have not been confirmed as being singularly significant in predicting, or causing readmissions. Rather clusters of factors appear to describe socio-economic, demographic, clinical, diagnostic, plus circumstances and influences that may align and occur at significant points in time, that could result in early readmissions. However, if readmission is to be considered an indicator of the quality of hospital care and the integration of services in the community, more of the variables or factors need to be confirmed as being actionable (modifiable) by hospital physicians and staff, as well as community care and follow-up programs.

The literature review confirmed a plethora of studies have examined factors and variables connected with readmissions primarily at urban centres with hospitals that have specialized inpatient psychiatric units. No research literature was located that examined psychiatric readmission factors or variables for rural generalist hospitals. Only one study was located on hospitalization rates on mental health and substance use issues that included Indigenous people (Wheeler et al., 2011). Regardless of these limitations, the readmission performance measure, along with community follow-up target measure, have been accepted by CIHI and British Columbia's Ministry of Health and new Ministry of Mental Health and Addictions. The Province has applied them to the regional Health Authorities as quality targets in the organizations' performance letters for all hospitals, even though there is less access to psychiatric care at generalist rural hospitals, or specialized mental health and substance use services in smaller rural communities.

Current performance measure. British Columbia's Ministry of Health Service Plan for 2018/19 to 2020/21 Objective 1.3 states: "Improved health outcomes and reduced hospitalizations for those with mental health and substance use issues through effective community services" (p. 9). The Ministry of Health performance measure for the regional health authorities on hospital readmissions was defined as: *Reduce the percentage (number) of people (age 15 and over) hospitalized for a mental health or substance use disorder, who are readmitted to a hospital within 30 days of discharge.*

The 2016/17 baseline measure was 14.7%, with 2017/18 forecast at 14.7%. The target measure for years 2018/19, 2019/20, and 2020/21 is to achieve 14.5% in each of these years. One of the key strategies to achieve this measure is: "Support the Ministry of Mental Health

and Addictions in the creation of a mental health and addictions strategy" (British Columbia MOH, 2018, p. 9).

The discussion section in this Ministry of Health performance measure states;

> This performance measure contains targets that have been chosen using a conservative estimate of improvement and may be revised in the future; progress toward achieving targets will be focused on increased specialized community-based supports, particularly coordinated and integrated team-based primary and community care programs to help those with mental health and/or substance use issues receive appropriate and accessible care. (British Columbia MOH, 2018, p. 9)

The section linking performance measures to objectives confirms the premise; "These efforts, along with effective discharge planning can help reduce hospitalizations for people with severe and complex mental health and/or substance use issues" (British Columbia MOH, 2018, p. 9).

CHAPTER 4

Rural Determinants of Mental Health

Mental Health and Substance Use Prevalence

Mental health and substance use issues are prevalent factors in northern rural communities (Labonte, 1999; Latkin, & Curry, 2003). While some Indigenous communities face particularly severe challenges, as demonstrated by higher rates of addiction and suicide (NCCAH, 2012; Smylie, & Firestone, 2015), non-Indigenous northern communities face significant pressures as well (Delaney, & Brownlee, 2009; Schmidt, 2009). Mental health and substance use issues pose a significant challenge to the health care system (Kruger, 2013). These health issues are difficult to address and recidivism rates are high, especially where affected individuals cannot leave high-risk environments due to poverty and remoteness. Homelessness or unreliable low standard housing and minimal positive family or social networks continually expose individuals to risk and offer little in the way of reliable support. Mental health and substance use issues also present as difficult underlying complications in other clinical/physical problems, preventing or significantly impeding successful treatment and management (British Columbia Mental Health & Substance Use Services [BCMH&SU], 2014).

The over-representation and higher prevalence rates for people with complex co-occurring mental health and substance use disorders in Northern British Columbia was confirmed by Somers, Moniruzzaman and Rezansoff (2014). Their unpublished study demonstrated that prevalence rates vary significantly between urban, rural, and remote areas of British Columbia. Although the largest numbers were found in the Health Authorities with

the largest city populations (Vancouver and Surrey), the highest per 100,000 capita prevalence rates were found in the Northern parts of the province.

Somers, Moniruzzaman, and Rezansoff, (2014) found the estimated prevalence rate of 113 per 100,000 adult population in Northern British Columbia was more than double the rate of people with severe addictions and mental illnesses (SAMI) compared to the other four regional Health Authorities that averaged 53 per 100,000. This meant that while the North has approximately 6% of the province's adult population, the study estimated 12.3% of the province's SAMI population resides in the North; a doubling factor that likely results in increased hospital usage rates.

Rural and Remote Access to Mental Health Care

The Mental Health Commission of Canada (2009) document *Toward Recovery & Well Being: A Framework for a Mental Health Strategy for Canada* estimated only one of every three adults who need help receive specialized treatment services, and only one out of four children and youth who need help actually receive mental health services (p. 68), and "the situation is worse in northern, rural, remote and other underserviced areas" (MHCC, 2009, p. 115). One goal of the MHCC framework is for people across Canada to have equitable access to programs, services, and supports; and to address the unique needs of Canadians living in northern, remote, and rural areas. This is necessary as Northern, remote, and rural areas face shortages of acute and community health care service providers. Several studies have evidenced that communities in northern Canada may have no family physicians, let alone psychologists, psychiatrists, or other specialized services (Manahan, Hardy, & McLeod, 2009; MHCC, 2009). Thomas, MacDowell, and Glasser (2012) also found a persistent shortage of

mental health and health care professionals in northern and remote areas was due to staff turnover. A recent provincial study stated rural and remote health care coverage is predominantly provided by nurses (RNs) and Nurse Practitioners (NPs) (NNPBC, 2018).

Impact of Rurality on Health Status

Living in a rural area can mean long distances and transportation problems that limit individual's access to care. Residing in rural and remote communities usually means living a distance from health care and mental health facilities and services, which limits the range of available services, even if needed (Bodor, 2009; Elliot, 2000; Harvey, 2009; Hoyt, Conger, Valde, & Weihs, 1997; Judd et al., 2006; Morton, 2003). In addition to limited access to care, living in a rural area can mean differences in employment and income, education quality and availability, poverty rates, housing, and years of life expectancy (Buila, Shirley, & Jurkowski, 2012; Costello, Keeler, & Argold, 2000; Galea, 2007; Jensen, McLaughlin, & Slack, 2003). Further, rural and remote communities in Canada are under considerable stress related to demographic, political, and economic variables beyond their control with communities often dependent on resource-based employment that is economically cyclical in nature (Delaney, & Brownlee, 2009; International Fund Agricultural Development, 2011; Schmidt, 2009). These rural needs often go unrecognized and inadequately resourced in planning by urban-centric policy makers (Collier, 1993; Kulig, & Williams, 2011).

Northern and remote regions also have some of the most challenging and complex mental health and social issues in Canada, from overcrowded housing, and lack of access to clean water and affordable food, to higher rates of suicide, chronic, and communicable diseases (Labonte, 1999; Latkin, & Curry, 2003). Health outcomes, as exemplified by higher

rates of death and shorter years of life expectancy, tend to be worse outside major centres. The main contributors to higher death rates and reduced life span in rural and remote areas are: coronary heart disease, other circulatory diseases, motor vehicle accidents, and chronic obstructive pulmonary disease (e.g. emphysema). These higher death rates may relate to differential access to services, risk factors, and the rural and remote environments (Kulig & Williams, 2011; VIHA, 2006;).

There are clear differences in health service usage between urban and rural areas (Jensen, McLaughlin, & Slack, 2003). Rural and remote areas have lower rates of some hospital surgical procedures, lower rates of physician consultation, and higher rates of hospital admissions than major cities (Statistics Canada, 2004a; VIHA, 2006). The CCHS 1.2 and CCHS 2.1 surveys also reported inter-regional differences in risk factors; for example, people from rural and remote areas tend to be more likely than their urban counterparts to smoke and drink alcohol in harmful or hazardous quantities (Statistics Canada, 2004a, 2004b).

Rural areas also face everything from shortages to a complete lack of services to address their mental health needs; as some remote places do not have physicians visit more than a few times a year. Related to this is the persistent shortage of mental health and health care professionals in northern and remote areas (Thomas, MacDowell, & Glasser, 2012). Over the longer term, training programs should be developed in the North to fill health care and mental health positions as they would more likely stay and work in underserviced areas (Manahan, Hardy, & MacLeod, 2009). When northern and remote areas are better served, people will not have to travel as often to other communities or other jurisdictions; although some travel will be unavoidable if people need to access specialized or tertiary level services (MHCC, 2012).

CHAPTER 5

Research Framework, Data & Hypotheses

Atheoretical Framework

This research study used an atheoretical approach, which is congruent with the Mental Health Commission of Canada (MHCC) position that a theoretical framework for mental health and substance use services in Canada needs to be developed as no current theory is comprehensive enough to include all aspects of these illnesses in peoples lives (MHCC, 2014, 2015 & 2018). Using an atheoretical approach allowed the study to be open to possibilities that may not have been apparent in a theoretical framework, which creates new knowledge and supports theory building.

Several reports by the MHCC (2014, 2015 & 2018) have identified the need to develop a pan-Canadian information and performance measurement framework specific to mental health and substance use (MH&SU). Given the complexity of mental health and substance use issues, MHCC states it is important to develop a framework articulating a "system" vision that aligns with policy directions and stakeholder values. This would help ensure balance across sets of indicators, protect against unintended effects, clarify associations among indicators, reveal gaps where development is needed, and be inclusive of stakeholders and service providers' viewpoints. The creation of a national framework would overcome some of the identified barriers, which include:

- lack of a shared conceptual framework to organize such a complex task,
- lack of shared understanding about such a relatively abstract and technical topic,
- confusion among players about roles and responsibilities for different actions at different levels of the system (MHCC, 2014, 2015 & 2018).

It is important to identify and address issues inherent in performance measurement. These include determining the purpose of performance measurement, whose performance will be measured, whether comparisons take local conditions into account, and capacity to generate quality measures and action the findings. Establishing shared principles and values will be important when establishing this framework. Stakeholders must be able to suggest additional concepts and world views - especially ones that are not represented in current performance measurements. It will be important for Indigenous and equity-seeking groups, to ensure the framework includes aspects that relate to their communities (MHCC, 2018).

The determinants of MH&SU include social and structural determinants with access to health services that influence outcomes. Unlike most other illnesses, only a proportion of those in need of MH&SU services either seek or obtain care (MHCC, 2009 & 2018). Indigenous people in Canada particularly experience substantial inequities in mental health and wellness (Cameron, Plazas, Salas, Bearskin, & Hungler, 2014). Related to this, mainstream mental health and substance use services do not always relate to Indigenous understandings of mental health, or ask culturally appropriate questions to assess mental illness or provide intervention supports (Vukic, Gregory, Matrin-Misner, & Etowa, 2011).

MHCC (2014, 2015 & 2018) identified the need for better MH&SU data to inform and support system changes at all levels. Organizations such as the Canadian Institute for Health Information (CIHI), the Public Health Agency of Canada (PHAC), the Canadian Centre on Substance Use and Addiction (CCSA), Statistics Canada, plus Provincial and Territorial governments, have all undertaken MH&SU data-related initiatives. While this activity has been encouraging, these initiatives have been relatively disconnected due to the lack of a pan-

Canadian information and performance measurement framework specific to mental health and addictions (Adair, et al., 2003) (MHCC, 2014, 2015 & 2018).

The MHCC position on need for a system-wide framework is also supported by the Centre for Addiction and Mental Health (CAMH), and the Ontario Drug Treatment Funding Program (DTFP), in the document *Strengthening Performance Measurement for Mental Health and Addiction in Ontario* which stated;

> "There is a wealth of performance data in Ontario, and an extensive literature based on performance measurements in the MH&SU service sector (ICES, 2015; Veillard et al., 2010). There is however, no framework or model outlining what constitutes high performance in this sector" (Urbanoski, 2017, p. 6).

The creation of such a framework would make it possible to measure and report on MH&SU outcomes across the country and service delivery systems, rather than each province or jurisdiction developing disconnected and incomparable service measures (Adair, et al. 2003). The task of developing a pan-Canadian MH&SU performance measurement framework is value-laden, which creates a divergence of opinions. A systematic approach would be necessary to develop a framework and set of indicators that stakeholders can endorse despite their plurality of views (MHCC, 2018).

Much of the research conducted on psychiatric hospital readmissions has been atheoretical because of methodological and theoretical weaknesses (Klinkenberg & Calsyn, 1996). Klinkenberg and Calsyn's (1996) comprehensive review determined the reasons being that multivariate statistics were rarely used as many studies were based on non-representative samples, and interactions between patient- level variables and system responsiveness variables were rarely studied. Instead, most of the research relied on archival data, with the

choice of variables being guided by available data rather than by theory. Is well, readmissions have been conceptualized as an interplay of patient, demographic, social, and clinical factors to identify potential factors for recidivism (Harrison, Barrow, & Creed, 1995; Korkeila, Lehtinen, Tuori, & Helenius, 1998; Ruggeri, Lesse, Thornicroft, Bisoffi, & Tausella, 2000; Sullivan, Wells, Morgenstern, & Leake, 1995).

Administrative Data

One source of information for planning mental health and substance use services is administrative data. In Canada, the provinces provide health care services, including mental illness and substance abuse, and collect information on the recipients in a variety of administrative datasets and systems. This information is generally accessible and cost-effective for research purposes (Frohlich et al., 2007). These data sets provide actual and occurring perspectives on the practices of providing interventions and treatment of mental health and substance use disorders. Administrative datasets can also provide reasonably precise estimates on treated prevalence that avoid recall biases which may be inherent in health surveys (Mortensen, 1995).

Mental health data has been used to research the effects of system changes on service use and quality of care (Greenberg & Rosenheck, 2005), examine variations in treatment practices across settings (Speer & Newman, 1996), and predict service utilization for specific populations (Karlin & Norris, 2006). In addition, mental health and substance use administrative data has been used to determine the proportion of the general population who have mental health and substance use problems and who receive treatment (Andrews, Issakidis, Sanderson, Corry, & Lapsley, 2004; Bulloch et al., 2011). Although the quality of

administrative data, particularly the coding of diagnoses, has been questioned, an investigation into the validity of administrative data concluded that diagnoses decided from visits to specialized mental health services were valid for many disorder categories (Frayne et al., 2010).

This research study used historic administrative and clinical data from hospitals to examine selected variables that may be associated with hospital admissions, and subsequent readmissions within 30 days measure; plus socio-economic, and demographic data from the community MRR to measure mental health and substance use (MH&SU) follow-up within 30 days post-hospital discharge (Creswell, 2014; Neuman, & Kreuger, 2003).

Data Storage and Destruction

To ensure secure data storage and confidentiality, a restricted folder on UNBC's network was created by IT Department. The folder was set to only grant access to the data by the researcher and supervisor of the PhD committee. After this, Northern Health IT Department provided a secure file transfer access portal, which Northern Health Corporate Services then gave access for the researcher to download the data file through the encrypted File Portal process between the two systems into the secure folder.

In regard to the duration of data storage, the Tri-Council Policy Statement (TCPS2) does not provide a minimum requirement for length of retention of research data, however it is generally agreed that research data be stored for a minimum of 5 years (Canadian Institutes of Health Research (CIHR), Natural Sciences and Engineering Research Council of Canada (NSERC), and Social Sciences & Humanities Research Council of Canada (SSHRC), 2014). On the other timeframe end; for formal clinical trials that can affect public health, the

Government of Canada recommends preserving data for up to 25 years (Government of Canada, 2005). In between these two-time limits (5-years to 25-years), the TCPS guidelines state research data is to be - retained for a length of time necessary to achieve the purpose for which it was collected (e.g. dissertation validation).

TCPS states that data retention periods vary depending on the discipline, the research purpose, the kind of data involved, and should align with provincial Freedom of Information and Protection of Privacy requirements (CIHI, NSERC, & SSHRC, 2014). In the absence of UNBC guidelines, as the data being secondary and non-identifying, it will be retained for the 7-year period the University of Waterloo recommends for PhD and Faculty research. This rule also aligns with most research funders, Canada Revenue Agency requirements, and University of Waterloo Classification and Records Retention Schedule (WatCLASS) standards (University of Waterloo, 2017).

Ethical Considerations

The Tri-Council Policy Statement (TCPS2) on Ethical Conduct for Research Involving Humans, Article 2.4 states: "Research Ethic Board (REB) review is not required for research that relies exclusively on secondary use of anonymous information …, so long as the process of data linkage or recording or dissemination of results does not generate identifiable information" (p. 17). TCPS2 Article 2.5 refers to "assessments of the performance of an organization … within the mandate of the organization …" and states: "Quality assurance and quality improvement studies, program evaluation activities, …. when used exclusively for assessment, management, or improvement purposes, do not constitute research for the

purposes of this Policy, and do not fall within the scope of REB review" (p. 18) (CIHR, NSERC, & SSHRC, 2014).

Research Data Collection

This research analyses historic secondary data from two computer systems used by Northern Health. One system is used in all British Columbia hospitals, while the second was used by the community MH&SU programs within the Northern Health region. Preparatory work was required to gather the data from the two information systems and combine it in one data file for analysis. The first step was to confirm the inclusion criteria with both the Ministry of Health as well as CIHI. There were some small detail differences which were clarified by communicating with both agencies. The next step was to use the accepted criteria (attached) to identify all the patients who met the measurement criteria to extract this information from the DAD hospital system. The next stage was for IT to use Personal Health Numbers (PHN) to extract the community MH&SU MRR data that aligned to each of the patients, if there was data. Following this the data from both systems was ordered to correspond to each individual patient, then arranged in temporal order by each patient's hospital episode(s) of care, and well as any community MH&SU contact that might have occurred in relation to each hospitalization.

Gathering the data. The first data set was gathered from Northern Health's hospital information system based on the Canadian Institute for Health Information (CIHI) reporting system called the Discharge Abstract Database (DAD). These data information fields (factors or variables) were collected from the hospital-based computer system used by all 18 acute care medical hospitals operated by Northern Health. The specific definitions for each factor

used in the DAD are based on the standardized definitions established by the Canadian Institute for Health Information (CIHI) for use nationally and provincially to ensure reliability. The information collected by the DAD specifies each individual who was hospitalized, provides the ICD 10 F diagnostic code as to the mental health or substance use reason for stay, the length of stay, and admission and discharge dates for each hospital episode of care, as well as age, date of birth, and gender, but does not contain any socio-economic demographic information or clinical services provided. The Province of British Columbia, Ministry of Health, Health Sector Planning & Innovation Division, Planning & Performance Branch, has adopted these measurement specifics and requires this information to be reported by the regional Health Authorities, of which Northern Health is one.

To obtain further factors about the patients, the clinical data information gathered through the community Mental Health and Substance Use (MH&SU) Minimum Reporting Requirements (MRR) system was also used. The British Columbia Ministry of Health and the five regional health authorities developed the MH&SU MRR variables to gather standardized information on a variety of mental health and substance use services and programs. This MH&SU MRR data is used by each health authority as well as the Provincial Government, Ministry of Health, and nationally by CIHI.

In 2010, Northern Health mental health and substance use services became the pilot health authority to implement this new MH&SU MRR system as it was the only health authority in the province (in Canada according to Accreditation Canada, and Dr. Brian Rush), to fully integrate mental health with substance use services in all communities and programs in the region. To support this integration, clinicians and physicians in both services had computer access to the new clinical information system at all MH&SU programs and services

in the Health Authority, for all levels of care (all community programs, residential facilities, and hospital wards).

The MH&SU MRR system also gathered the patient's Personal Health Number (PHN), which allowed matching patient specific information with hospital services. Depending on the type and length of involvement a patient had with community MH&SU services, the MRR system collected socio-economic and demographic indicators, such as the patient's marital status, household composition, Indigenous and First Nations identify indicator, living location, highest level of education, employment status, source of income, criminal justice involvement, history of suicide attempts and violence, and ages of first use and extent of use of alcohol, tobacco, marijuana, and other substances, as well as diagnoses specified by the Diagnostic and Statistical Manual of Mental Disorders 4th ed., Text Revision (DSM-IV-TR) (American Psychiatric Association (APA, 2000)[1]. The amount of information gathered for each of these variables varied based on the type and length of involvement the patient had with community MH&SU services; e.g. whether the service was one-time due to a crisis, or ongoing support and case management.

Data Collection Definitions.

- Diagnostic Codes: The International Classification of Diseases (ICD) Version 10-CA (World Health Organization, 2010) classification codes describe the diagnoses, conditions, problems, or circumstances of the patient during their stay in a health care facility. A patient may have multiple ICD codes listed as reasons for stay, however one code is considered "primary" and the others are "secondary". The patients and

[1] (Note: DSM-IV-TR was the DSM version used during the five-year data collection period).

admissions included in this study are ones where the primary reason for hospital stay was a mental health or substance use issue. During the period of data gathering for this research, community mental health and substance use visitations used the Diagnostic Statistical Manual, Version IV, Text Revised (DSM IV TR) codes.

- Diagnostic Cluster: A group of two or more valid ICD-10-CA or DSM IV TR diagnostic codes that relate to one another. Assigning the same diagnosis cluster links these codes together on the abstract. Individual diagnostic codes listed in 5.b.i. to iv. below have been arranged into CIHI standardized diagnostic clusters for the analysis.

Measurement specifications.

1. Unit of Analysis is an episode of care. An episode of care refers to all contiguous inpatient hospitalizations regardless of diagnoses. An episode of care can include a transfer from a rural generalist hospital to a regional hospital providing specialized inpatient psychiatric care.
2. Study population or denominator: all CIHI ICD MH&SU (including Eating Disorders) hospitalization episode counts (including readmissions) as primary reason for stay. In this study the population consists of 5159 individuals who had a total of 9103 hospital episodes of care admissions and readmissions.
3. First sub-group or numerator cluster: all CIHI ICD MH&SU (including Eating Disorders) readmission episode counts within 30 days after each episode of care.
4. Second sub-group or numerator cluster: all Community MH&SU service follow-ups that occurred within 30 days after each episode of care.
5. Inclusions:

a. A mental health or substance use illness is ICD coded as the primary or most responsible diagnosis (MRDx) as reason for the hospital stay.

b. Each patient and episode of care is given a specific ICD diagnostic code. In order to analyse patterns, ICD diagnosis codes for mental illnesses and substance abuse disorders have been grouped in the following clusters:

   i. Substance-related disorders—ICD-10-CA: F55, F10 to F19; DSM-IV: 291.x (0, 1, 2, 3, 5, 81, 89, 9), 292.0, 292.11, 292.12, 292.81, 292.82, 292.83, 292.84, 292.89, 292.9, 303.xx (00, 90), 304.xx (00, 10, 20, 30, 40, 50, 60, 80, 90), 305.xx (00, 10 to 90 excluding 80); Provisional diagnosis xxviii: (d) substance-related disorder; or

   ii. Schizophrenia, delusional and non-organic psychotic disorders—ICD-10-CA: F20 (excluding F20.4), F22, F23, F24, F25, F28, F29, F53.1; DSM-IV: 295.xx (10, 20, 30, 40, 60, 70, 90), 297.1, 297.3, 298.8, 298.9; Provisional diagnosis xxviii: (e) schizophrenia disorder; or

   iii. Mood/affective disorders—ICD-10-CA: F30, F31, F32, F33, F34, F38, F39, F53.0; DSM-IV: 296.0x, 296.2x, 296.3x, 296.4x, 296.5x, 296.6x, 296.7, 296.80, 296.89, 296.90, 300.4, 301.13; Provisional diagnosis xxviii: (f) mood disorders; or

   iv. Anxiety disorders—ICD-10-CA: F40, F41, F42, F43, F48.8, F48.9, F93.8; DSM-IV: 300.xx (00, 01, 02, 21, 22, 23, 29), 300.3, 308.3, 309.x (0, 3, 4, 9), 309.24, 309.28, 309.81; Provisional diagnosis xxviii: (g) anxiety disorders or (o) adjustment disorders; or

v. Selected disorders of adult personality and behaviour—ICD-10-CA: F60, F61, F62, F68, F69, F21; DSM-IV: 301.0, 300.16, 300.19, 301.20, 301.22, 301.4, 301.50, 301.6, 301.7, 301.81, 301.82, 301.83, 301.9; Provisional diagnosis xxviii: (p) personality disorders.

vi. Eating disorders—ICD-1--CA: F50 (Excludes anorexia NOS (R63.0)), F50.0, F50.1, F50.2, F50.3, F50.4, F50.5, F50.8, F50.9.

c. Hospital discharges that occurred prior to April 1st in the first year of the study (2010) would not be included in the community 30-day follow-up data. In reverse, community follow-up after a hospital episode of care in the month of March in the final year (2015) would not be in the community 30-day follow-up data. This is due to both data sets using the same beginning and end dates.

d. Age at admission is 15 years or older for the hospital data. For the community MH&SU data it is generally 19 and older.

e. Sex male, female, or other (hermaphrodite, transsexual or undifferentiated).

f. Admission to an acute care hospital, generalist or specialized.

g. Canadian resident.

6. Exclusions:

a. Records with an invalid health card number

b. Records with an invalid admission date

c. Records with an invalid date of birth

d. Records with an invalid discharge date

e. Discharged as a death

7. Readmission Inclusion Criteria: An episode of care is counted as a hospital readmission if the following conditions are met:
    a. The patient was re-admitted to a hospital within 30 days of discharge, and the primary reason for their previous hospital admission stay was for mental health or substance use treatment.
    b. A diagnosis of mental illness or substance use was recorded as the reason for the readmission (see denominator criteria used to select ICD diagnoses).

Participants

Denominator population. Based on the inclusion and exclusion criteria above, the denominator for this study was the total population of all 5159 individuals who had at total of 9103 hospital admissions for mental health or substance use issues in the 18 Northern Health hospitals during the five-year period April 1, 2010 through March 31, 2015. Two parameters were used to align the data with CIHI and Provincial reporting. One was using fiscal years (April 1st through March 31st) for the data collection; the second being ages of inclusion, 15 years and over.

The data included the total population of all the patients who were hospitalized for mental health and or substance use issues in all 18 Northern hospitals during the five-year period. Using a multi-year data set of all admitted patients ensured the study had a complete representation of patients admitted to Northern hospitals for mental health or substance use issues. The size of multi-year data set helped eliminate limitations on sampling errors, or potential variations in inclusion coding, concerns about seasonal population changes in

smaller communities, as well as socio-economic factors that could affect smaller communities seasonally or with resource-based economic cycles.

The study used the ICD diagnostic F code inclusion criteria developed by CIHI to gather hospital admission information on all patients who had a care episode during the five-year period (2010-2015) for either a mental health or substance use issue. Physicians use numerous ICD diagnostic codes to specify the variety of medical reasons for a patient's hospital stay; however, the CIHI criteria for inclusion in studying mental health and substance use is to only use the ICD code for the "primary reason for stay" to create patient population datasets. For example, if a person was intoxicated and had a motor vehicle accident resulting in a medical injury, the medical injury would usually be coded as the primary reason for stay, with the alcohol misuse being secondary. Using this example, the patient would not be included in the study denominator population. However, if a person was intoxicated and suicidal which led to their hospitalization, either of these codes would fit the primary criteria for inclusion.

Numerator population. The numerator population was the patients who had contact with community Mental Health and Substance Use (MH&SU) services provided by Northern Health during the five-year period of data. The numerator group was examined to determine whether the contact with community MH&SU services occurred as part of follow-up after a hospital discharge, and if so in what timeframe the follow-up occurred in. The criteria of the second quality performance measure was used; follow-up post-hospital discharge within 30 days. Related to this the five selected factors were examined to determine whether any had an influence on this performance measure, and if so, to what extent. Of the 5159 patients

hospitalized during the five-year period, 4512 (87.5%) had contact with community MH&SU at some point during the five-year period.

Information on the 647 individuals (12.5%) who did not have any contact with a Northern Health community mental health and substance use program was examined to determine whether explanations could be derived on why follow-up contact did not occur. Four possible explanations were considered but not verified due to individual identity information having been removed from the data set to ensure patient anonymity.

1. The patient's information was not contained in the community MH&SU MRR system as they might have been hospitalized for a non-severe mental health or substance use event. Having follow-up by a Primary Care physician or non-health authority service was possibly the appropriate level of aftercare required.
2. The patient was a youth (age 15 through 18 years). This age group made up 532 (10.3%) of the 5159 patients who potentially could have received follow-up services from the Ministry of Children and Family Development (MCFD) Child and Youth mental health staff, or an agency contracted with MCFD.
3. The patient was an older adult (65 years and over). This age group consisted of 375 (7.3%) patients who could have been provided home support or residential care following hospital discharge by Home and Community Care programs.
4. The patient was Indigenous and accessed First Nations Health Authority funded in-community (on reserve) health care services or counselling at Native Friendship Centres. Community MH&SU MRR information recorded 1265 (24.5%) of the patients identified as Indigenous, with slightly over half, 649 (12.6%) having "Status".

Data Matching Process

The initial step was to create a data set of all hospital admissions for mental health and substance use episodes of care during the five-year period (April 1, 2010 through March 31, 2015) based on the Ministry of Health and CIHI's definitions and criteria. The hospital DAD system provided the admission date and discharge date for each episode of care. This process identified 5159 patients who had 9103 hospital episodes of care during the five-year period. Using Personal Health Numbers (PHN), the patients were matched to records in the community Mental Health and Substance Use Minimum Reporting Requirements (MH&SU MRR) clinical data for the same five-year period. Matching the two data sets was completed by a Northern Health Information Technical Analyst who ensured the patients' names, addresses, and other potential identifying information was removed and not accessible to the researcher. The matching determined that of the 5159 patients, 4512 (87.5%) had contact with community MH&SU at some point during the five-year period, while 647 (12.5%) did not.

The next stage required setting up a temporal relationship between each hospitalization, and determining when the patient had activity recorded in the community MH&SU MRR system, as the performance measures need to confirm whether the contact was prior to or following each hospitalization. The community follow-up measure is based on contact within 30 days after each hospital episode of care. Based on this criterion, the information from the two data sources was aligned in temporal order for each patient to determine each hospital admission and discharge date, then each community MH&SU contact to determine if follow-up, or a hospital readmission, occurred within the 30-day time frame for both measures. It should be noted an exclusion criterion for the follow-up measure is that

if the community MH&SU contact occurred on the same day as the patient was discharged from the hospital, it would not be counted in the follow-up rate (Ministry of Health and CIHI).

Issue measuring community follow-up. In establishing these temporal sequences for community MH&SU follow-up, a situation was identified about how community MH&SU follow-up events post-hospitalization might be counted for this performance measure. For example, if a patient was discharged from a hospital on the 3rd of a month, then readmitted on the 10th and discharged on the 15th, then subsequently seen by community MH&SU on the 16th and 25th of the month; which of the community follow-up contacts would count toward which post-hospitalization, as they both occurred within 30 days of the initial hospitalization, although they were both after the second hospitalization?

There are several options to decide how this situation could meet the community follow-up within 30 days measure. They are: 1) Would the first community MH&SU follow-up activity count for the first hospital discharge as it occurred within 30 days, even though the individual was rehospitalized prior to being seen? 2) Would the second community MH&SU follow-up date count toward the second hospitalization episode? Or, 3) Would the first community MH&SU follow-up date count for the second hospital discharge, and none be counted for the first hospitalization as both community MH&SU follow-ups occurred after the second episode?

For these situations, the Ministry of Health developed a fourth interpretation when applying the follow-up performance measure: 4) Not count the first hospitalization in the follow-up measure. Instead, the Ministry of Health only uses the second hospital discharge date to determine whether the community follow-up occurred within 30 days. Using this

method, the Provincial statistics show an increased rate of community follow-up by having reduced the number of hospitalizations included in the measure; e.g. not including the initial hospitalization if a second hospitalization occurs before the community MH&SU follow-up occurred within the 30-day period.

As the data for this research included all the hospitalizations and rehospitalizations that occurred in the five-year period, and dates of community MH&SU follow-up contact, the analysis used the data for all 9103 hospitalizations, and connected each discharge date to the most proximal community MH&SU follow-up contact that occurred after each hospitalization. Including all hospitalizations provides a more exact determination of the frequency of all (re)hospitalizations and community MH&SU follow-ups that occurred, but could provide a lower community MH&SU follow-up rate than the Ministry of Health performance statistics.

Research Questions and Methodologies

A total of 34 variables were extracted from the hospital DAD and community MH&SU MRR information systems for possible analysis for this research, however not all had sufficient data for analysis. After running descriptive frequencies on 18 of the variables, five (5) were selected for further analysis against the two quality performance measures. Reddy's (2014) framework of nine categories was followed to organize variables when analyzing statistical data involving mental health and substance use patients. The nine categories were grouped based on whether they were - Static (Clinical) or Modifiable factors.

STATIC:

1) Demographic – community, age, sex, marital status, etc.,
2) Socio-cultural – religion, domicile, culture, etc.,
3) Socio-economic – education, occupation, income, etc.,
4) Family – family structure, relationships, family size, etc.,

CLINICAL (Static)

5) Signs and symptoms – hallucinations, delusions, etc.,
6) Diagnostic – schizophrenia, mania, etc.,

MODIFIABLE

7) Treatment – psychotropic drugs, ECT, psychotherapy, etc.,
8) Hospitalization – duration or length of stay, etc.,
9) Outcomes – type of discharge, result of treatment, etc. (Reddy, 2014).

The data analysis for this research focuses on one factor in five of the nine static factors; 1) Demographic, 2) Socio-cultural, 3) Socio-economic, 4) Family, and 5) Diagnostic, in relation to the two performance measures. The five factors or variables were identified to base hypotheses on for each performance measure. The analysis concludes with, the modifiable factor; 9) Outcomes, by examining the inter-relationship of the two-quality performance measures the Ministry of Health identified in the Service Plan, Objective 1.3 for mental health and substance use services, by exploring the statistical association between the two performance measures.

Research Construct

There are three foci in this study. First, to determine whether five (5) selected factors are statistically associated with rates of readmission for people hospitalized due to mental health or substance abuse illness in generalist hospitals in Northern British Columbia. Secondly, to determine whether the same five (5) factors are also associated with access to community MH&SU follow-up post-hospitalization. A third aspect is to consider whether the two quality performance measures have a statistical association with each other; and if so, the strength and direction of that relationship.

Ministry of Health – Service Plan Objective

Ministry of Health – Service Plan for 2018/19 to 2020/21 – Objective 1.3 states: "*Improved health outcomes and reduced hospitalization for those with mental health and substance use issues through effective community services."*

This objective refers to both quality performance measures and their inter-relationship; reduced hospitalizations through improved connections with community services.

Quality Performance Measure - one:

The first Quality Performance Measure by the Ministry of Health for the regional health authorities on hospital readmissions is: *Reduce the percentage (number) of people (age 15 and over) hospitalized for a mental health or substance use disorder, who are readmitted to a hospital within 30 days of discharge* (based on a fiscal year, April 1st to March 31st). The data in this study covers a five-year period rather than annual. This was done for a couple of reasons. Rural hospitals have a small number of MH&SU patients during a year. Due to this, a small number of patients change can create a large percentage shift in the readmission

measure. Further, Northern communities economically depend on resource-based industries which have economic cycles fluctuate and create significant variations in numbers of hospitalizations. To compensate for these effects, a multi-year population was used to reduce the volatility of annual percentages. Based on this, the measure in this study is: "mean numbers of hospitalizations" in the five-year period, rather than annual percentages. The following hypotheses are based on mean numbers of hospitalizations for the first qualify performance measure.

Hospitalization Hypotheses:

1.1 Patients residing in smaller rural communities will have higher mean numbers of hospitalizations in comparison to patients in larger communities with specialized services.

1.2 Patients culturally identified as Indigenous will have higher mean numbers of hospitalizations in comparison to non-Indigenous patients.

1.3 Patients with an employment activity will have lower mean numbers of hospitalizations than patients who were unemployed.

1.4 Patients in a relationship will have lower mean numbers of hospitalizations than patients not in a relationship.

1.5 Patients with ICD Schizophrenic Diagnostic F Codes for their initial hospitalization will have higher mean numbers of hospitalizations in comparison to patients diagnosed with other ICD F code categories.

Quality Performance Measure - two:

The second Quality Performance Measure was defined by the Ministry of Health for the regional health authorities on community follow-up as: *Increase the percentage (number) of people (age 15 and over) who had been hospitalized for a mental health or substance use disorder, to receive community MH&SU and/or physician follow-up within 30 days of discharge.* The Provincial percentage target was to achieve a 90% follow-up rate in the community for MH&SU patients within 30 days of discharge from an acute care hospital.

To determine the percentage of community follow-up for patients who had been hospitalized for MH&SU reasons, the Ministry of Health calculates the rate of community follow-up by accessing the following five sources of patient data:

1. Primary Care Physicians – Medical Services Plan (MSP) billing invoices.
2. Community Mental Health & Substance Use (MH&SU) follow-up - recorded in MRR patient e-system.
3. Psychiatrists – MSP billing if seen at private clinic, or MRR e-system if seen at community MH&SU program.
4. Addiction services- included in MH&SU MRR e-system with the integration of services in Northern Health. However, Indigenous non-profit societies providing addiction counseling (e.g. Native Friendship Centres) use paper-based AIMS (Addiction Information Management System).
5. Ministry of Children and Family Development (MCFD) child and youth mental health (CYMH) information system for youth ages 15 to 18 years.

The community MH&SU MRR e-system used for follow-up with this research (numerator) collected data from three of the five sources the Ministry of Health accesses

(numbers 2, 3, and 4). Due to confidentiality, patient data could not be obtained from Primary Care Physicians (1), nor the Ministry of Children and Family Development (MCFD) (5).

Although two data sources were not accessed, the community MH&SU numerator data provided an 87.5% match rate with the DAD hospital (denominator) data. The study population of 5159 and numerator of 4512 provided a Confidence interval of 99.0% at the <0.01% Margin of Error (3842/5000 required).

Initially annual data was examined to look for percentages of community follow-up within 30 days for each fiscal year (April 1st to March 31st). This was done Regionally, then for each of the three Health Service Delivery Areas (HSDA), then at the community level for each of the 18 communities. It was found the percentages of community follow-up on an annual basis varied greatly each year due to small numbers of patients in some communities. These results indicated that trends could not be confirmed based solely on annual percentages. Due to the inconsistent findings, it was decided to use a five-year period of data instead of annual. This required changing the definition of the second performance measure from annual percentage of follow-up within 30 days post-hospital discharge to wait times. The definition for the second measure was modified to "mean grouped wait times to access community MH&SU follow-up". The grouped wait times indicated whether the follow-up occurred within 30 days or not, plus provided grouped wait times in which the follow-up occurred. Both performance definitions focused on whether the community follow-up occurred within 30 days post-hospitalization; one uses percentages, the other uses means of grouped wait times. It should be noted for both measure definitions, wait time is a poor indicator of community follow-up, because it is more indicative of availability (or lack) of community resources, than an indication of patient needs for follow-up.

In relation to this point, while the Ministry of Health can access five sources of data, it should be noted that MH&SU patients can receive follow-up services from a number of agencies and programs that the Ministry of Health is unable to collect data from which could also be appropriate for patient needs; services such as:

- Federally funded residential addiction treatment centres (e.g. First Nations Health),
- On-reserve First Nations health care services (e.g. Health Centres, Federal Physicians, Nurse Practitioners), and Spiritual healing by First Nations Elders,
- Church programs, religious and pastoral support,
- Employee and Family Assistance Programs (EFAP),
- Community-based self-help peer groups (Alcoholics Anonymous AA, or Narcotics Anonymous NA),
- Private treatment companies or centres,
- Community forensics, community probation, correctional facilities (Provincial and Federal),
- Nurse Practitioners, and Physicians on salary.

The hypotheses for the second performance measure examining mean grouped wait times to access community MH&SU follow-up, related to the same five factors used in the first performance measure.

Community Follow-up Hypotheses:

2.1 Patients residing in smaller rural communities will have longer wait times to access community MH&SU follow-up in comparison to patients in larger communities with specialized services.

2.2 Patients culturally identified as Indigenous will have longer wait times to access community MH&SU follow-up in comparison to non-Indigenous patients.

2.3 Patients with an employment activity will have longer wait times to access community MH&SU follow-up that patients who were unemployed.

2.4 Patients in a relationship will have longer wait times to access community MH&SU follow-up than patients not in a relationship.

2.5 Patients with ICD Schizophrenic Diagnostic F Codes for their initial hospitalization will have shorter wait times to access community MH&SU follow-up in comparison to patients diagnosed with other ICD F code categories.

In addition, the intersection of the two Quality Performance Measures, based on the Ministry of Health – Service Plan for 2018/19 to 2020/21 – Objective 1.3, will be analysed to determine whether a statistical relationship between the two quality performance measures exists.

Measures Intersection Hypotheses:

3.1 Patients rehospitalization rates will be statistically associated with whether patients received community MH&SU follow-up within 30 days.

Data Analysis Using IBM SPSS

The analysis of the data was completed using IBM's Statistical Program for Social Sciences (SPSS) version 25. Selected variables were examined to provide descriptive and statistical descriptions of factors to portray the patient population. Following this, five selected factors or variables related to each research hypotheses were analysed for statistical associations they might have to each of the two quality performance measures.

CHAPTER 6

Research Findings

The following section provides a socio-demographic summary of the 5159 hospitalized patients based on the descriptive frequency findings from factors and variables drawn from the two patient information systems. [2]

Socio-Demographic Characteristics

Of the 5159 patients who were admitted for mental health or substance use issues, 1265 (24.5%) were Indigenous; an over-representation 1.4 times their population proportion. The sex or gender coding for all 5159 patients showed slightly more males (2691, 52.2%) admitted compared to females (2468, 47.8%). In comparison, there was a slightly higher percentage of Indigenous female patients (50.3%) admitted compared to Indigenous male patients (49.7%).

The age range for the 5159 patients was 84 years; from the lower cut-off age of 15 years, up to 99 years of age. Of the 5159 patients, the mode age was 15 years, median was 38 years, and mean was 39.3 years, with a standard deviation of 16.5 years (22.8 years to 55.8 years). The youngest age group of patients were age 15 through 18 years (532, 10.3%). The majority of patients 4252 (82.4%) were adults age 19 to 64 years. The age group with the smallest numbers was older adults (375, 7.3%) ages 65 years and over.

For patients whose highest education level completed was known, 3362 (65.2%) had information in the community MH&SU MRR system. The largest number had completed

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[2] Table 2 follows this narrative summary to provide the socio-demographic characteristics. For further details on these characteristics, refer to Tables 16 through 28 in Appendix E.

grade 10 through 12 (1930) (57.4%). The second largest education level group completed either vocational training or college (710) (21.1%). The third largest educational grouping was middle school, grades seven through nine (475) (14.1%). The fourth largest educational group was patients who had completed a university program, either at the undergraduate or graduate level (172) (5.1%). A small number of patients' highest education attainment level was no schooling or kindergarten through grade 6 (75) (2.2%).

At the time of hospitalization, the largest employment classification for patients was Unemployed but eligible to work 1053 (20.4%). The second largest group was Employed 857 (16.6%). They were followed closely by patients On Disability from work 775 (15.0%). A few patients were Not in the Labour Force (not seeking work) 221 (4.3%). Patients who were Students 196 (3.8%) had similar numbers to those who were Retired 173 (3.4%). Homemakers 141 (2.7%) and Other employment status 86 (1.7%) made up the next smaller employment groups. A small number of patients received either Supported Employment funding 26 (0.5%), or Peer Support six (0.1%), plus paid Volunteer five (0.1%). Almost 30% of the patients' employment status was either Unknown/not asked 828 (16.0%), Missing 647 (12.5%), or Not Applicable 31 (0.6%).

Regarding the patients' marital status, the largest number were Never married - single 1950 (37.8%). The second group was patients who were Married or common-law 921 (17.9%). The third group was patients who were Separated 358 (6.9%), followed by patients who were Divorced 256 (5.0%), and patients who were Widowed 132 (2.6%). Almost 30% of the patients' marital status was either Unknown/not asked 895 (17.3%), or the data was Missing 647 (12.5%).

The household composition for the largest group of patients was Lives with relatives 1876 (36.4%). This is followed by, patient Lives alone 1041 (20.2%), and Lives with non-relatives 845 (16.4%). There was no information for two groups, Unknown/not asked 750 (14.5%), plus Missing data 647 (12.5%).

The living arrangement for the largest percentage of patients was Rental housing 1364 (26.4%), plus rental options such as Supported Housing 113 (2.2%) and Rental Subsidized 36 (0.7%). The second largest group was patients who Owned their home 1106 (21.4%). The third group was patients who were Sheltered Homeless 144 (2.8%), Precariously Housed 80 (1.6%), or Absolutely Homeless 41 (0.8%). A small number of patients had been living in Facilities, either Mental Health 41 (0.8%), youth in MCFD Foster Care 28 (0.5%), or Seniors in Health Care 14 (0.3%), or Substance Use treatment facilities six (0.1%). A very small number of patients were in Corrections or Forensic facilities six (0.1%), or the Provincial Assessment Centre (DDMH) (CLBC) two (0.0%) for people with mental disabilities. Other patients had Unspecified forms of accommodation 211 (4.1%), plus No living arrangement information was gathered on 1537 (29.8%) of the patients.

Regarding the patients' parenting status, the largest group of patients were Not currently providing care to children 1861 (36.1%) at the time of service. The second largest group was Not applicable, has no children 670 (13.0%). Of the patients who had children in their care, the group Currently providing care 583 (11.3%) was largest, followed by those who had their children in the Care of others 435 (8.4%), with some doing Both 70 (1.4%). There were three categories with no parenting status information, Null 729 (14.1%), Missing 647 (12.5%), plus Unknown/not asked 164 (3.2%).

A quarter of the patients 1276 (24.7%) indicated they had a history of trauma, plus another 151 (2.9%) had their trauma history confirmed by someone. A further 1052 (20.4%) patients denied having a history of violence or abuse. For many patients 2033 (39.4%) their trauma history was Unknown or not asked, plus another 647 (12.5%) patients the information was Missing.

For the category history of suicide attempts, approximately half the information was Unknown or not asked 1816 (35.2%), or Missing 647 (12.5%). Of the patients who were asked about prior suicide attempts, slightly more stated they had No history 1392 (27.0%), compared to 1304 (25.3%) of the patients who confirmed they had a history of suicide attempts or significant self-harm events.

Most patients had no criminal justice involvement 2591 (50.2%), with another fifth Unknown or not asked 1045 (20.3%). The data was Missing for 647 (12.5%), plus Other 266 (5.2%), or Not applicable 193 (3.7%) categories. Of the patients who had criminal justice involvement, the largest number were those who had been Convicted and serving a community order (probation or parole) 217 (4.2%), followed by Arrested but not in custody while awaiting trial 180 (3.5%). A small number had been arrested and were in custody 11 (0.2%), or Convicted and in custody nine (0.2%).

The mental health and substance use diagnoses for all 9103 patient admissions were grouped into six ICD diagnostic F Code classification categories for analysis, which were:

1) Substance-related (F10-19),
2) Schizophrenia and psychosis disorders (F20-29),
3) Mood and affective disorders (F30-39),
4) Anxiety disorders (F40-49),

5) Eating disorders (F50), and,

6) Personality and behaviour disorders (F60-69).

Of the six ICD F Code diagnostic classification groupings, F30-39 mood (affective) disorders was largest with 1826 (35.4%) patients. The second largest group, F10-19 mental and behavioural disorders due to psychoactive substance use had 1726 (33.5%) patients. The third largest diagnostic group was F20-29, schizophrenia, schizotypal, and delusional disorders for which 809 (15.7%) of the patients were admitted. The fourth group was F40-49, neurotic, stress-related, and somatoform disorders (anxiety) for which 681 (13.2%) patients were admitted. The fifth grouping was F60-69, adult personality, and behaviour disorders for which 75 (1.5%) patients were admitted. The smallest diagnostic group was F50-59, behavioural syndromes associated with physiological disturbances and physical factors (eating disorders) for which 42 (0.8%) patients were admitted.

Table 2 *Socio-Demographic Characteristics of Patients -1*

Factors	Value Labels	*n*	%
One & more rehospitalizations		1677	32.4
	One Readmission	851	16.5
	Two Readmissions	348	6.7
	Three Readmissions	179	3.5
	Four or more Readmissions	299	5.8
Culture Identity	Indigenous	1265	24.5
Gender	Male	2691	52.2
	Female	2468	47.8
Age Range 15 to 99 years	mode	15 years	
	median	38 years	
	mean	39.3 years	
Education Level	grades 10 - 12	1930	57.4
	vocational or college	710	21.1
	grades 7 through 9	475	14.1
	university program	172	5.1
	Grade 6 or less	75	2.2
Employment Status	Unemployed	1053	20.4
	Employed	857	16.6
	On Disability	775	15.0
	Not seeking work	221	4.3
	Students	196	3.8
	Retired	173	3.4
	Homemakers	141	2.7
	Other employment	86	1.7
	Unknown/not asked	828	16.0
	Missing	647	12.5
Marital Status	Single Never married	1950	37.8
	Married /common-law	921	17.9
	Separated	358	6.9
	Divorced	256	5.0
	Widowed	132	2.6
	Unknown/not asked	895	17.3
	Missing	647	12.5

Socio-Demographic Characteristics of Patients -2

Factors	Value Labels	*n*	%
Living Arrangement	Rental housing	1364	26.4
	Supported Housing	113	2.2
	Rental Subsidized	36	0.7
	Owned their home	1106	21.4
	Sheltered Homeless	144	2.8
	Precariously Housed	80	1.6
	Absolutely Homeless	41	0.8
	Mental Health facility	41	0.8
	MCFD Foster Care - youth	28	0.5
	Seniors in Health Care	14	0.3
	Substance Treatment facilities	6	0.1
	Corrections/Forensic facilities	6	0.1
	Provincial Assessment Centre	2	0.0
	Unspecified accommodation	211	4.1
	No Arrangement information	1537	29.8
Parenting Status information	Not providing care to children	1861	36.1
	Not applicable/no children	670	13.0
	Currently providing care	583	11.3
	Children in the care of others	435	8.4
	Both - with self & others	70	1.4
No parenting status information	Null	729	14.1
	Missing	647	12.5
	Unknown/not asked	164	3.2
History of Trauma	Self-disclosed	1276	24.7
	Disclosed by other	151	2.9
	Denied Trauma history	1052	20.4
	Unknown or not asked	2033	39.4
	Missing.	647	12.5
History of suicide attempts	Self Disclosed	1304	25.3
	No history	1392	27.0
	Unknown or not asked	1816	35.2
	Missing	647	12.5

Socio-Demographic Characteristics of Patients- 3

Factors	Value Labels	*n*	%
Criminal justice involvement	None	2591	50.2
	Unknown or not asked	1045	20.3
	Missing	647	12.5
	Other	266	5.2
	Not applicable	193	3.7
	Convicted (probation/parole)	217	4.2
	Arrested but not in custody	180	3.5
	Arrested and in custody	11	0.2
	Convicted and in custody	9	0.2
ICD diagnostic F Codes	Substance-related (F10-19)	1726	33.5
	Schizophrenia/psychosis (F20-29)	809	15.7
	Mood & affective (F30-39)	1826	35.4
	Anxiety disorders (F40-49)	681	13.2
	Eating disorders (F50)	42	0.8
	Personality/behaviour (F60-69)	75	1.5

Hospital Admissions (1 to 36)

The 5159 patients had a total of 9103 hospital admissions over the five-year period also showed a range in number of hospitalizations. The minimum number of admissions recorded was 1, to a maximum of 36, with a mean of 1.76. Two-thirds of the patients 3487 (67.6%) only had one hospital admission, with no subsequent readmission in the five-year period. Almost one-third of the patients 1672 (32.4%) had two or more hospitalizations. Of the 1672 patients, 851 (16.5%) had a second admission, 348 (6.7%) a third, 179 (3.5%) a fourth, 97 (1.9%) a fifth, 59 (1.1%) a sixth, 48 (0.9%) a seventh, and 25 (0.5%) an eighth admission, making up 98.7% of the admissions. The remaining 65 (1.3%) patients had nine up to 36 hospital admissions. One patient had 13 more hospitalizations than any other patient, experiencing a total of 36 hospitalizations during the five-year study period.

Length of Stay (LOS)

The length of stay (LOS) for the initial hospital episode for the 5159 patients varied greatly from less than one day, up to 320 days. The mode LOS was 1 day, median 4 days, and mean 9.68 days, with a standard deviation of 17.1 days. The shortest LOS in the initial hospitalization for 386 (7.5%) patients was less than one day, being admitted and discharged the same day. The largest number of patients 880 (17.1%) were admitted for a one-day LOS. The second largest group 597 (11.6%) had a two-day LOS. The number of patients with a three-day LOS was 443 (8.6%). By day four, slightly over half of the patients 2630 (51.0%) had a LOS from 0 to 4 days. Each subsequent day for LOS consisted of less patients. Almost three quarters of the patients 3863 (74.9%) stayed between 0 and 11 days. Another 1031 patients (20.0%) stayed between 12 and 32 days for a cumulative total of 4894 (94.9%). The remaining 265 (5.1%) patients had LOS ranging from 33 to 320 days for their initial hospitalization.

For the 9103 hospital admissions, the 5159 patients had a total of 97,124 days hospital stay. Using this total, it would have meant the 5159 patients had an average of 18.82 days hospital stay for the 9103 admissions. In comparison, the initial hospitalization length of stay (LOS) for all 5159 patients consisted of a total of 49,930 days, or an average 9.68 days LOS per patient. Examining the 1672 patients who had readmission episodes, their readmissions provided a total of 47,194 days, for an average 28.22 days LOS. On average, if a patient was re-hospitalized their readmissions would result in them having almost three times (2.92) LOS days compared to the patients who only had an initial hospitalization.

In addition, the mean LOS for each (re)hospitalization showed an increased length of stay. The initial hospitalization episode LOS had a mean of 9.68 days. The LOS for

subsequent readmissions had increased mean LOS days (e.g. episode two LOS was 12.36 days; episode three 12.03 days; episode four 12.75 days; episode five 11.01 days, and episode six 13.46 days LOS).

Community MH&SU Follow-up

Reviewing the second performance measure of whether community MH&SU follow-up occurred within 30 days; the five-year period of data indicated wide ranges in lengths of time as to when patients had follow-up contact (if it occurred). For the initial hospitalization of the 5159 patients, 3996 (77.5%) had follow-up contact with community MH&SU services at some point in time. Of these, 2752 (53.3%) patients had contact within 30 days of their hospital discharge, and 2407 (46.7%) did not. However, about half of the second group 1237 (24.0%) received follow-up at some point between 31 days and 1825 days. The remaining 1163 (22.5%) patients did not have follow-up contact with community MH&SU services.

When looking at when the community MH&SU follow-up contact occurred, the timeframes set out by Dharmaraja et al. (2013) of 0-3 days, 4-7 days, 8-15 days, 16-30 days, and over 30 days were used. It should be noted that for this measure the British Columbia Ministry of Health does not include Community MH&SU service follow-up in the measure if the contact occurred on the same day the hospital discharge occurred, only the day after, so while the grouping is 0 to 3 days, the actual count used was 1 to 3 days. On day one (the day after discharge) 624 (12.1%) of the patients had contact; day two 253 (4.9%) of the patients; and day three 210 (4.1%) of the patients. This meant a total of 1087 (21.1%) of the 5159 patient who were hospitalized had community MH&SU service contact within the first three days after hospital discharge. Days four to seven had less community MH&SU service

contacts than days one to three, but still significant numbers occurred. On Day four 199 (3.9%) of patients had contact, day five 147 (2.8%) patients, day six 177 (3.4%) patients, and day seven 163 (3.2%) patients. This meant within the first week following hospital discharge 1773 (34.4%) of the patients had community MH&SU contact.

The number of community MH&SU service contacts for days eight to fifteen continued to decline gradually; day eight had 99 contacts, day nine had 83, day ten had 92, day eleven 71, day twelve 62, day thirteen 65, day fourteen 59, and day fifteen 54; providing a total of 585 (11.3%) of Community MH&SU service follow-up contacts during the second week following hospital discharge. This meant 2358 (45.7%) of all the discharged patients had a follow-up contact by the end of the second week. During days sixteen through thirty, a smaller number, 394 (7.6%) of the patients had their Community MH&SU service contact. The numbers each day ranged from a low of 15 to a maximum of 51, for an average of 26.7 patients each day during the last two weeks of the month. This averaged 197 patients per week having Community MH&SU service contact for each of the last two weeks. Overall, a total of 2752 (53.3%) of the patients had Community MH&SU service follow-up within the 30-day measure timeframe.

In summary, focusing on days one to thirty of the follow-up measure, the initial days after hospital discharge had the largest numbers for Community MH&SU service follow-up. During these 30 days 2752 (53.3%) of all the patients with an initial hospitalization were seen. The first week was most significant with approximately one-third 1773 (34.4%) of the follow-up contacts occurring. The second week was slightly less significant with 585 (11.3%) of the follow-up contacts. The last two weeks of the 30-day measure had a lower rate with 394 (7.6%) of the Community MH&SU service follow-ups contacts occurring.

After the 30-day measure cut off, in the next month (Days thirty-one to sixty), an additional 274 (5.3%) of the patients had Community MH&SU service contact. Between two and twelve months another 571 (11.1%) of the patients had follow-up contact. The three-quarters point was not reached until day 975 (2 2/3 years) at which time 3890 (75.0%) of the patients had Community MH&SU service contact. A small number of patients 106 (0.2%) received follow-up contact during the following three years. Overall, a total of 3996 (77.5%) of the 5159 patients had follow-up contact by Day 2106 (5 3/4 years) after their initial hospitalization. The remaining 1163 (22.5%) patients did not receive follow-up contact from Community MH&SU services.

Statistical Methodology Overview

Analysis of the quantitative data used SPSS statistical methodologies to explore the static, clinical, and modifiable factors in relation to the two performance measures. The variables were grouped using Reddy's (2014) suggested categories, which include age, sex, ethnicity (Indigenous or non), marital status, number of children, living arrangement, housing, education level, employment status, criminal justice involvement, suicide, and trauma history. A total of 31 factors or variables were coded and run using SPSS Frequencies. These are contained in Appendix E for examination in greater detail.

In choosing which data analysis methodology was most suitable several statistical methodologies were trialed on the dependent and independent factors or variables that had been collected. As the focus of the research was on the two quality performance measures, and whether either occurred within 30 days, measure one, Hospital readmission within 30 days, was coded 'yes' or 'no', and measure two, community MH&SU follow-up within 30

days was also coded ‘yes’ or ‘no’. Each of the dichotomous categorical dependent variables were then examined in association to the categorized independent factors.

Preliminary Logistic Regressions were run to capture the effects of independent variables on both performance measures. Although most of the independent variables were statistically significant in relation to each performance measure, the effects size of the value labels within each independent factor or variable turned out to be statistically insignificant. For example, while the factor “Employment” was statistically significant, the type of employment status (the value) was not statistically significant. Similarly, the factor “Marital Status” was statistically significant, but the value or type of relationship was not. Those results are not reported here, but are available from the author.

As many independent variables had significance to each of the dependent measures, Factor Analysis was also run. The purpose being to reduce the large number of significant factors or variable to a smaller set that had more significance to determine which factors to include for analysis in the study (Green & Salkind, 2008). The initial statistics, scree plot, and Eigenvalues indicated that seven components or factors had an Eigenvalue of more than 1.0, and several additional factors were close to 1.0. A visual review of the Scree plot showed a long gradual slope to the right without a definitive change in slope; signifying that numerous factors had association to the performance measures, rather than two, three or four factors having the most significant.

Due to Logistic Regression and Factorial Analysis limitations on indicating which independent factors had greater significance, or showing the effect size of the values in each factor, it was decided to transform the two dependent performance measures from

dichotomous variables. The first measure into a continuous variable and the second into a hierarchical variable to run One-way ANOVA with Post Hoc tests to examine each factor.

The first dependent performance variable "readmission" was recoded from 'yes' or 'no', into the continuous number of hospitalizations that occurred – '1' sequentially to '36', based on the initial hospitalization (1) with up to 35 subsequent readmissions a patient might have had. The second dependent quality measure, community MH&SU follow-up within 30 days was recoded from 'yes' or 'no', into hierarchical groupings of number of days wait until community MH&SU follow-up occurred; regardless of whether it was under or over 30 days. As the number of wait days ranged from 0 up to 1825; the wait days were grouped using the model by Dharmarajan, et al. (2013). The groupings of dates were: 0 to 3 days, 4 to 6 days, 7 to 14 days, 15 to 30 days, 31 to 60 days, 61 to 365 days, and 366 to 1825 days. This created a dependent variable that was continuous, with seven manageable wait-day groupings to be used for comparative analysis.

The changes to both performance measures allowed running One-way ANOVA General Linear Model (GLM) and Post Hoc tests on each dependent measure in relation to selected independent factors. One-way ANOVA analysis uses an omnibus *F*-statistic and effect sizes to determine whether the means of groups, formed by one or more of the independent variables, are significantly different (Field, 2013; Gaur & Gaur, 2009; Menard, 2010). Following this, Tukey Post Hoc tests were run to calculate the strength of association between the value label groups to determine the differences between them (Cohen, 1988; Field, 2013; Pallant, 2007; Tabachnick & Fidell, 2013). The result was descriptive information on the statistical significance and effect size for each factor or variable, and the values within each were generated. The purpose being to provide omnibus statistical

significance and effect size of each independent variable when matched to each dependent performance measure; as well as to examine the significance of each value label in relation to the other values within each factor.

The next section of the paper provides the analysis of first quality performance measure, “number of hospitalizations” (1 to 36) in association with selected categorical independent variables and their respective values using ANOVA. This is followed by the second quality performance measure “community MH&SU follow-up” (grouped wait days) in association with the same categorical independent variables and their respective values.

One-Way Analysis of Variance (ANOVA)

Rehospitalization Performance Measure and Five Factors

This section describes the analysis using One-way between groups ANOVA general linear model GLM and post hoc comparisons in statistically examining the dependent (continuous) variable "Number of Hospitalizations 1 to 36" (first quality performance measure), in relation to the five (5) independent (categorial) variables identified in the hypotheses.

The Omnibus F test of the main effect or interaction and statistical level of significance was run for each independent variable, and the effect size calculated using Eta Squared. If the F test was statistically significant ($p < .05$) then Tukey's honestly significant difference (HSD) was run as a Post Hoc test, plus Homogeneous Subsets to examine the statistical significance of each value to other values within each variable.

For this section, the One-Way ANVOA analysis focuses on the first performance measure (number of hospitalizations) comparing it to five (5) variables, which are Static, from five of the nine categories suggested by Reddy (2014).

STATIC:

1) Demographic – **community** the hospital is located, patient's age, and sex.
2) Socio-cultural – **Indigenous** identity group, First Nations status, and on-reserve.
3) Socio-economic – highest education completed, and **employment** status.
4) Family – **marital status**, household, living arrangement, and parenting status.
5) Diagnostic – criminal justice involvement, and **ICD diagnostic F codes** (Reddy, 2014).

STATIC

Demographic – community the hospital is located, patient's age, and sex.

Hospitalization Hypothesis:

1.1 Patients residing in smaller rural communities will have higher mean numbers of hospitalizations in comparison to patients in larger communities with specialized services.

1. **Hospitalization Rates by Hospital City.**

One-way between groups ANOVA with Tukey HST post-hoc tests were conducted to explore the impact of the rurality of communities on numbers of (re)hospitalizations that patients experienced. The numbers of hospitalizations ranged from 1 up to 36 for study population over the five-year period.

The 18 communities with hospitals were arbitrarily clustered into three groups of six communities each based on population size and catchment area; as well as level of staffing, and whether the hospital had specialized services (see Table 1).

1. The category "Rural" was used for the six communities with populations of 2,000 or less. Medical and health care coverage at these hospitals was primarily provided by nurses 24/7, with Primary Care physicians based in the community attending the hospital on coverage or on-call basis. At the time of the study, most of these hospitals did not have an observation room, which meant patients detained under the Mental Health Act then were to be transported (air or ground) to an "Urban" hospital as they were designated under the Mental Health Act.
2. The category "Mid-size" was for the six communities whose populations were over 2,000 up to 10,000. These hospitals generally had physicians on staff to provide

generalist medical care. All these hospitals (except one) had an observation room where a patient could be held under the Mental Health Act and could access psychiatric consultation through telehealth.

3. The category "Urban" was used for the six communities with populations over 10,000. These hospitals either had a psychiatric unit or dedicated observation rooms, which were supported by psychiatrists, nursing staff and other specialized roles.

There was no statistically significant difference at the $p < .05$ level in the scores between the three different community sizes: F (2, 5156) = 1.0. The differences in hospitalization rates between the three categories of community sizes were not statistically significant. The effect size, calculated using eta squared was .000, confirmed the community size did not have a statistical association to hospitalization rates.

Post hoc comparisons using the Tukey HSD test also indicated the mean scores for the three sizes of communities were not statistically different. Rural communities (M = 1.71, SD = 1.63) were similar to Urban communities (M = 1.75, SD = 1.78) hospitalization rates. Mid-size communities (M = 1.83, SD = 2.09) had a slightly higher mean hospitalization rate, but were not statistically different from Rural or Urban communities on numbers of hospitalizations.

Table 3 *ANOVA – Community Size by Number of Hospitalizations*

Community & Population	Mean	Std. Deviation
Rural (< 2000)	1.71	1.631
Mid-Size (2000-10,000)	1.83	2.092
Urban (>10,000)	1.75	1.678

Socio-cultural – Indigenous cultural identity.

Hospitalization Hypothesis:

1.2 Patients culturally identified as Indigenous will have higher mean numbers of hospitalizations in comparison to non-Indigenous patients.

2. Hospitalization Rates by Indigenous Cultural Identity.

One-way ANOVA was conducted to explore the number of hospital admissions to whether the patient identified as being Indigenous. The 5159 patients were clustered into three cultural identity groups; whether the patient identified as "Indigenous", identified as "Non-Indigenous", or their cultural identity was Unknown or Not asked.

There was a statistically significant difference at the $p < .05$ level in the scores between the three cultural identity groups: F (2, 5156) = 100.47, p = .000. The hospitalization rates of the three cultural identity groups were significantly different from each other. The effect size, calculated using eta squared was .038, confirmed patient's cultural identity had a small effect on hospitalization rates.

Post hoc comparisons using the Tukey HSD test indicated the mean scores for the three cultural identity groups were statistically significantly different from each other. Patients who identified as Indigenous (M = 2.15, SD = 2.136) had the highest (re)hospitalization rates. Their hospitalization rates were statistically higher than Non-Indigenous patients (M = 1.89, SD = 1.902). Both groups where the cultural identity was known had statistically higher (re)hospitalization rates than the patient group whose cultural identity was Unknown or Not asked (M = 1.29, SD = 0.927).

Table 4 *ANOVA – Indigenous Cultural Group by Number of Hospitalizations*

Indigenous Cultural Group	Mean	Std. Deviation
Indigenous	2.15	2.136
Non-Indigenous	1.89	1.902
Unknown/Not Asked	1.29	0.927

Socio-economic – highest education completed, and employment status.

Hospitalization Hypothesis:

1.3 Patients with an employment activity will have lower mean numbers of hospitalizations than patients who were unemployed.

3. Hospitalization Rates by Employment Status.

One-way ANOVA was conducted to explore the number of hospital admissions in relation to the patients' employment status. The 5159 patients were clustered into three employment status groups; whether they were "Employed", did activities in a "Volunteer" capacity, or if they were "Unemployed".

There was a statistically significant difference at the $p < .05$ level in the scores between the three employment groups: F (2, 5145) = .003. Only one of the employment status categories hospitalization rates was statistically different from the other two. The effect size, calculated using eta squared was .002, confirming employment status had very small effect on hospitalization rates.

Post hoc comparisons using the Tukey HSD test indicated the mean scores for the employment category of Volunteer, was statistically different from the other two categories. Patients who were "Volunteers" had the highest (re)hospitalization rate (M = 2.62, SD =

3.192) compared to the other two employment categories. Patients who were Unemployed (*M* = 1.78, *SD* = 1.801), had similar (re)hospitalization rates to patients who were Employed (*M* = 1.69, *SD* = 1.565), which had the lowest (re)hospitalization rate. These latter two employment categories were not statistically different from each other.

Table 5 *ANOVA - Employment Category by Number of Hospitalizations*

Employment Categories	Mean	Std. Deviation
Employed	1.69	1.565
Unemployed	1.78	1.801
Volunteer	2.62	3.192

Family – marital status, household, living arrangement, parenting status.

Hospitalization Hypothesis:

1.4 Patients in a relationship will have lower mean numbers of hospitalizations than patients not in a relationship.

4. Hospitalization Rates by Marital Status.

One-way ANOVA was conducted to explore the number of hospital admissions, to the patients' marital status. The 5159 patients were clustered into three groups based on relationship status; whether they were "Married or in a Relationship", if they had previously been in a relationship but were "Divorced or Separated", or they were "Single-Never married".

There was a statistically significant difference at the $p < .05$ level in the scores between the three relationship status groups: F (2, 5156) = .000. Two of the relationship status groups had hospitalization rates statistically different from the third. The effect size,

calculated using eta squared was .028, confirming relationship status had a small effect on hospitalization rates.

Post hoc comparisons using the Tukey HSD test indicated the mean scores for the relationship status of "Single-Never Married was statistically significant compared to the other two categories. Patients who were "Single-Never Married" had the highest (re)hospitalization rate (M = 2.13, SD = 2.255) compared to the other two relationship categories. Patients who were Married or in a relationship (M = 1.65, SD = 1.424), had similar (re)hospitalization rates to patients who were Separated or Divorced (M = 1.50, SD = 1.281), who had the lowest (re)hospitalization rate. These latter two relationship categories were not statistically different from each other.

Table 6 *ANOVA - Marital Status by Number of Hospitalizations*

Marital Status	Mean	Std. Deviation
Single-Never Married	2.13	2.255
Married /Relationship	1.65	1.424
Separated/Divorced	1.50	1.281

Diagnostic – criminal justice involvement, ICD diagnostic F codes

Hospitalization Hypothesis:

1.5 Patients with ICD Schizophrenic Diagnostic F Codes for their initial hospitalization will have higher mean numbers of hospitalizations in comparison to patients diagnosed with other ICD F code categories.

5. **Hospitalization Rates by Four ICD Diagnostic F Code Groups.**

   One-way ANOVA was conducted to explore the number of hospital admissions,

compared to the patients' ICD diagnostic F coding group. Of the 5159 patients, 5042 were grouped into four ICD F Diagnostic Code clusters in the DSM IV TR Axis 1. They were, F10-19 (Alcohol & Substance use), F20-29 (Schizophrenia & Psychosis), F30-39 (Depression & Bi-Polar), and F40-49 (Anxiety & Adjustment).

There was a statistically significant difference at the $p < .05$ level in the scores between the four ICD Diagnostic categories: F (3, 5038) = .000. Three of the F code categories had (re)hospitalization rates that were statistically similar. The fourth F code category was statistically different from the other three. The effect size, calculated using eta squared was .023, confirming the diagnostic code had a small effect on hospitalization rates.

Post hoc comparisons using the Tukey HSD test indicated the mean score for the ICD diagnostic F code, F20-29 (Schizophrenia & Psychosis) (M = 2.34, SD = 2.497) was statistically different compared to the three other F code groups; F10-19 (Alcohol & Substance use) (M = 1.73, SD = 1.597), F30-39 (Depression & Bi-Polar) (M = 1.63, SD = 1.456), and F40-49 (Anxiety & Adjustment) (M = 1.50, SD = 1.522), which had the lowest (re)hospitalization rate. The latter two diagnostic ICD F code groups (F30-39 and F40-49) did not have statistically different from each other.

Table 7 *ANOVA - ICD Diagnostic F Code by Number of Hospitalizations*

ICD Diagnostic F Code Groups	Mean	Std. Deviation
F10-F19 Alcohol & Substance Use	1.73	1.597
F20-F29 Schizophrenia & Psychosis	2.34	2.497
F30-F39 Bipolar & Depression	1.63	1.456
F40-F49 Anxiety & Adjustment	1.50	1.522

One-Way Analysis of Variance (ANOVA)

Community MH&SU Follow-up Performance Measure and Five Factors

The following section applied One-way between groups ANOVA general linear model GLM and post hoc comparisons to examine the dependent (continuous) variable "Community Mental Health and Substance Use follow-up" (the second performance quality measure). This was done using grouped wait-days for post-hospitalization community MH&SU follow-up contact, in relation to five (5) of the independent (categorial) variables analyzed in in the first performance measure. The Omnibus F test of the main effect or interaction and statistical level of significance was run for each independent variable, and the effect size calculated using Eta Squared. If the F test was statistically significant ($p < .05$) then Tukey's honestly significant difference (HSD) was run as Post Hoc as well as Homogeneous Subsets to examine relationships and statistical significance of each value to others within the independent variables.

For this performance measure, the time frame for community MH&SU follow-up contact was to occur within 30 days or less. To determine more specific follow-up timeframes, the days were organized into six groupings of dates; which were: 1 = 0-3 days, 2 = 4-7 days, 3 = 8-15 days, 4 = 16-30 days, 5 = 31-60 days, and 6 = 61-365 days.

It should be noted when reviewing the Tables in this section, that "Mean" uses numbers; 1, 2, 3 4, 5 & 6 (with decimal points), and the numbers 1.00 through 6.99 refer to the groupings of days, not individual days. For example; a Mean of 2.45 would be group 2, or 4 to 7 days until community MH&SU contact; and a Mean of 3.89 would be a high group 3, or 8 to 15 days before contact, and close to group 4, or 16-30 days; not almost 4 days.

For this section, the One-Way ANVOA analysis focuses on the second performance measure in relation to five (5) variables, which are listed in the following categories suggested by Reddy (2014).

STATIC:

1) Demographic – **community** the hospital is located, patient's age, and sex.
2) Socio-cultural – **Indigenous** identity group, and First Nations status.
3) Socio-economic – highest education completed, and **employment** status.
4) Family – **marital status**, household composition, living arrangement, and parenting status (children or not).
5) Diagnostic – criminal justice involvement, and **ICD diagnostic F codes** (Reddy, 2014).

STATIC

Demographic – community the hospital is located, patient's age, and sex.

Community Follow-up Hypothesis:

2.1 Patients residing in smaller rural communities will have longer wait times to access community MH&SU follow-up in comparison to patients in larger communities with specialized services.

1. **Community MH&SU Follow-up Wait Days by 3 Community Sizes**

One-way between groups ANOVA with post-hoc tests were conducted to explore whether the rurality of a community impacted on the number of grouped wait days for patients to access community MH&SU follow-up services. The groupings for the wait days were, 1 = 0-3 days, 2 = 4-7 days, 3 = 8-15 days, 4 = 16-30 days, 5 = 31-60 days, 6 = 61-365 days, and 7 = 366-1825 days, to cover potential follow-up within the five-year period.

As described on pages 108-109, the 18 communities with hospitals were clustered into three groupings of six communities each, based on population size and level of health care services provided. "Rural" for communities with populations of 2,000 or less. "Mid-size" where the populations were over 2,000 up to 10,000; and "Urban" where communities had populations over 10,000.

There was a statistically significant difference at the $p < .05$ level in the scores between the three community sizes: F (2, 3897) = .000. The differences between the three community grouped sizes for wait days for community MH&SU follow-up services was statistically significant. The effect size, calculated using eta squared was .023, confirming community size had a small effect on wait days to access community MH&SU services post-hospital discharge.

Post hoc comparisons using the Tukey HSD test indicated the mean grouped wait days for two of the three communities group sizes were not statistically different from each other, however the third community group size was statistically significant in relation to the other two community sizes. Grouped wait days for follow-up in Rural communities (M = 4.09, SD = 2.322) were similar to Mid-size communities (M = 3.84, SD = 2.188), both showing similar mean wait days to access community follow-up. In comparison, Urban communities (M = 3.18, SD = 2.025) had statistically significant lower mean grouped wait days than the other two community sizes for patients to access community MH&SU follow-up services.

Table 8 *ANOVA – Community Size by Community MH&SU Follow-up Wait*

Community Size & Population	Mean	Std. Deviation
Rural (< 2000)	4.09	2.322
Mid-Size (2000-10000)	3.84	2.188
Urban (> 10000)	3.18	2.025

Mean: 1=0-3 days, 2=4-7 days, 3=8-15 days, 4=16-30 days, 5=31-60 days, 6=61-365 days.

Socio-cultural – Indigenous cultural identity.

Community Follow-up Hypothesis:

2.2 Patients culturally identified as Indigenous will have longer wait times to access community MH&SU follow-up in comparison to non-Indigenous patients.

2. Community MH&SU Follow-up by Indigenous Cultural Identifier.

The 5159 patients were clustered into three cultural identity groups; whether they identified as "Indigenous", identified as "Non-Indigenous", or whether their cultural identity was Unknown/or Not asked.

There was a statistically significant difference at the $p < .05$ level in the scores between the three cultural identity groups: F (2, 3897) = .000. The wait days for the three cultural identity groups to access community MH&SU follow-up had statistically significant differences. The effect size, calculated using eta squared was .048, confirmed cultural identity had a small, but close to medium effect on number of wait days to access community MH&SU follow-up.

Post hoc comparisons using the Tukey HSD test indicated the mean scores for the three cultural identity groups had statistically significant differences from each other. Patients whose cultural identity was Unknown or Not asked (M = 3.96, SD = 2.242) had the longest

mean grouped wait time to access community MH&SU follow-up services. Patients who identified as Indigenous (M = 3.71, SD = 2.204) had the second longest grouped wait times to access community MH&SU follow-up services. Both cultural identity groups had statistically longer mean grouped wait times than patients identified as Non-Indigenous (M = 2.93, SD = 1.881), who had the shortest mean grouped wait time to access community MH&SU follow-up services of all three groups.

Table 9 *ANOVA – Indigenous Cultural by Community MH&SU Follow-up Wait*

Indigenous Cultural Group	Mean	Std. Deviation
Indigenous	3.71	2.204
Non-Indigenous	2.93	1.881
Unknown/Not Asked	3.96	2.242

Mean: 1=0-3 days, 2=4-7 days, 3=8-15 days, 4=16-30 days, 5=31-60 days, 6=61-365 days.

Socio-economic – highest education completed, and employment status

Community Follow-up Hypothesis:

2.3 Patients with an employment activity will have longer wait times to access community MH&SU follow-up that patients who were unemployed.

3. Community MH&SU Follow-up by 3 Employment Status Groups

The 5159 patients were clustered into three employment status groups; whether they were "Employed", did activities in a "Volunteer" capacity, or they were "Unemployed".

There was no statistically significant difference at the $p < .05$ level in the scores of the three employment groups: F (2, 5145) = .107 on mean grouped wait times to access community MH&SU follow-up services. None of the employment status categories showed

statistically significant differences in grouped wait times for follow-up. The effect size, calculated using eta squared was .001, confirming employment status had no effect on wait times to access community MH&SU follow-up services.

Post hoc comparisons using the Tukey HSD test mean scores for the three employment categories were similar and not statistically different in relation to each other. Patients who were Volunteers (M = 3.03, SD = 1.975) had the shortest mean grouped wait time to access community MH&SU follow-up services; but were not statistically different from the other two employment categories. Patients who were Unemployed (M = 3.39, SD = 2.127), had similar mean grouped wait times to patients who were Employed (M = 3.25, SD = 2.018). The results indicated the three employment categories did not have statistical significance in relation to wait times for patients to access community MH&SU follow-up services.

Table 10 *ANOVA – Employment Category by Community MH&SU Follow-up Wait*

Employment Category	Mean	Std. Deviation
Volunteer	3.03	1.975
Employed	3.25	2.018
Unemployed	3.39	2.127

Mean: 1=0-3 days, 2=4-7 days, 3=8-15 days, 4=16-30 days, 5=31-60 days, 6=61-365 days.

Family - marital status, household, living arrangement, parenting status

Community Follow-up Hypothesis:

2.4 Patients in a relationship will have longer wait times to access community MH&SU follow-up than patients not in a relationship.

4. Community MH&SU Follow-up by Marital Status

One-way ANOVA was conducted to explore the length of time in mean grouped wait times for community MH&SU follow-up to occur, by the patients' marital status. The 5159 patients were clustered into three marital status groups based on their relationships; whether they were 1) "Married or in a Relationship", 2) if they had previously been in a relationship but were "Divorced or Separated", or 3) if they were "Single-Never married".

There was a statistically significant difference at the $p < .05$ level in the scores between the three relationship status groups: F (2, 3897) = .000. Of the three relationship groupings, only one group had a mean grouped wait time follow-up that was statistical different from another group. Two relationship groups had no statistical difference from each other. The effect size, calculated using eta squared was .006, showing relationship status had limited effect on wait times to access community MH&SU follow-up services.

Post hoc comparisons using the Tukey HSD test indicated the mean scores for the relationship status of Separated or Divorced was statistically significant difference from the other two relationship categories. Patients who were Separated or Divorced (M = 3.55, SD = 2.157) had the longest mean grouped wait times to access community MH&SU follow-up services, compared to the other two relationship categories. Patients who were Married or in a relationship (M = 3.34, SD = 2.040), had similar grouped wait times as patients who were Single or Never married (M = 3.19, SD = 2.063); both having the shortest grouped wait times to access community MH&SU follow-up services. The latter two relationship categories were not statistically different from each other.

Table 11 *ANOVA - Marital Status Group by Community MH&SU Follow-up Wait*

Marital Status	Mean	Std. Deviation
Divorced or Separated	3.55	2.157
Married or Relationship	3.34	2.040
Single - Never Married	3.19	2.063

Mean: 1=0-3 days, 2=4-7 days, 3=8-15 days, 4=16-30 days, 5=31-60 days, 6=61-365 days.

Diagnostic – criminal justice involvement, ICD diagnostic F codes

Community Follow-up Hypothesis:

2.5 Patients with ICD Schizophrenic Diagnostic F Codes for their initial hospitalization will have shorter wait times to access community MH&SU follow-up in comparison to patients diagnosed with other ICD F code categories.

5. Community MH&SU Follow-up by ICD Diagnostic F Code Group

One-way ANOVA was conducted to explore the length of time using the means of grouped wait times for community MH&SU follow-up to occur, compared to the patients' ICD diagnostic F coding group. Of the 5159 patients, 3900 were clustered into four ICD F Diagnostic Code Axis 1 clusters in the DSM IV TR. They were 1) F10-19 (Alcohol & Substance use), 2) F20-29 (Schizophrenia & Psychosis), 3) F30-39 (Depression & Bi-Polar), and 4) F40-49 (Anxiety & Adjustment).

There was a statistically significant difference at the $p < .05$ level in the scores between the four ICD Diagnostic categories: F (3, 3896) = .000. All four of the ICD diagnostic F code categories had statistical significance in relation to each other and community MH&SU follow-up mean grouped wait times. The effect size, calculated using

eta squared was .073, confirming the ICD diagnostic F code had a medium effect on wait times to access community MH&SU follow-up services hospitalization rates.

Post hoc comparisons using the Tukey HSD test indicated the mean scores for each of the four ICD diagnostic F codes were statistically different in relation to the other three. The F code F20-29 (Schizophrenia & Psychosis) (M = 2.51, SD = 1.772) had the shortest mean grouped wait time to access community MH&SU follow-up services. The code group F30-39 (Depression & Bi-Polar) (M = 3.14, SD = 1.929) had the second shortest mean grouped wait time to access community services. The code group F40-49 (Anxiety & Adjustment) (M = 3.52, SD = 2.022) had the third longest mean wait time. The ICD F code group with the longest mean grouped wait time to access community MH&SU services was F10-19 (Alcohol & Substance use) (M = 4.05, SD = 2.274). All four ICD F code groupings had statistically significant differences from each other regarding their wait times to access community MH&S follow-up services.

Table 12 *ANOVA - ICD Diagnostic F Code by Community MH&SU Follow-up Wait*

ICD Diagnostic F Code Groups	Mean	Std. Deviation
F10-F19 – Alcohol & Substance use	4.05	2.274
F20-F29 - Schizophrenia & Psychosis	2.51	1.772
F30-F39 - Bipolar & Depression	3.14	1.929
F40-F49 – Anxiety & Adjustment Disorders	3.52	2.022

Mean: 1=0-3 days, 2=4-7 days, 3=8-15 days, 4=16-30 days, 5=31-60 days, 6=61-365 days.

In the next section logistic regression binary analysis was performed on the Quality Performance measure dependent variable “readmission within 30 days” as an outcome, to assess prediction of membership. This was done applying the model of five categorical independent predictor variables, plus the second Quality Performance measure, “community

MH&SU follow-up within 30 days". The five independent predictor variables; community size, Indigenous, employment status, marital status, and ICD F Code diagnosis, were also examined regarding their influence in this model.

INTERCHANGE BETWEEN TWO MEASURES – FINDINGS

This section uses a logistic regression binary analysis on the dependent variable, "readmission within 30 days" as an outcome to assess prediction of membership. This was done applying the model of five categorical independent predictor variables, plus the second performance measure, "community MH&SU follow-up within 30 days". The analysis examines the first quality performance measure in association with the five independent factors, plus the association with the second performance measure to determine predictive relationships (Reddy, 2014).

MODIFIABLE

6) Outcomes – **community MH&SU follow-up**, hospitalizations, and wait days after hospital discharges. (Reddy, 2014).

Modifiable Outcomes – community MH&SU follow-up by hospitalizations

The intersection of the two Quality Performance Measures is based on the Ministry of Health – Service Plan for 2018/19 to 2020/21 – Objective 1.3, to determine whether a statistically significant predictive relationship between the two quality performance measures exists, and the influence of the five independent variables chosen for this study.

Measures Intersection Hypotheses:

3.1 Patients rehospitalization rates will be statistically associated with whether patients received community MH&SU follow-up within 30 days.

3.1 Rehospitalizations by Community MH&SU Follow-up.

Rationale for Choosing Logistic Regression

A regression model that analyses two or more independent variables that are categorical is factorial logistic regression. However, factorial logistic regression requires the

dependent variable to solely be dichotomous. Logistic regression answers the same questions as discriminant analysis, and multiple regression, using a dichotomous dependent variable. It is more flexible in studies as the predictors do not have to be normally distributed, linearly related to the dependent variable, or have equal variance within each group.

The use of Logistic regression is to predict the category of outcome for individual cases, after establishing there is an association between the outcome and the set of predictors. Logistic regression is the same concept as linear regression; but instead of predicting a continuous response a binary one is predicted. Once the model is fitted, the coefficients say how important each covariate was for predicting the outcome.

Logistic regression is a more flexible analysis as it allows prediction of group membership when the predictors (IVs) are either continuous, discrete, dichotomous, or a combination. It provides an evaluation of the odds ratio of membership in one of the groups; based on the combination of values of the predictor variables.

Some studies use Relative Risk (RR) to describe results; others use Odds Ratio (OR). Both measure association between a binary outcome variable and a continuous or binary predictor variable; and both are calculated from 2x2 tables; however, they are interpreted differently. The difference is Relative Risk is a ratio of two probabilities, whereas Odds Ratio is a ratio of two odds. Relative Risk, also called Risk Ratio (a ratio of two probabilities) compares the incidence or risk of an event among those with a specific exposure with those who were not exposed (e.g. getting 2 out of 5 is a probability of 2/5, or 40%). It is only appropriate to use Relative Risk for prospective cohort studies, which this study is not.

In comparison, Odds Ratio compares the number of events with the number of non-events, which is the design of this research study. An odds ratio is the ratio of two odds,

which compares the presence, to absence of an exposure; given the outcome is already known (e.g. hospital readmission or not). It is expressed slightly differently, (e.g. getting 2 out of 5 gives the odds of 2 to 3, or 2:3, or 0.667). This is equivalent to the probability of an event, or the probability of a non-event. An Odds Ratio can also be used to describe the results of case control, as well as prospective cohort studies.

Logistic Regression generates Odds Ratios (and 95% confidence levels) for each variable or factor as the strength of association between the risk factors and the frequency of outcome. If the odds ratio is <1, the odds are decreased for an outcome; if the odds ratio >1, this means the odds are increased for an outcome. If the odds ratio =1, there is no association between the risk factor and the outcome.

Logistic Regression Findings

To conduct the analysis the two dependent variables (performance measures) were recoded from continuous data to dichotomous (binary) data. Based on the two Quality Performance measures, the binary data to run logistic regression on the outcome was either; "yes, readmitted", or "no, not readmitted". Similar binary data for community MH&SU follow-up outcome was coded as; "yes, occurred within 30 days", or "no, did not occur within 30 days".

A logistic regression binary analysis was then performed on each dependent variable to assess prediction of membership. This was done applying the model of five selected categorical independent predictor variables, plus the second performance measure, community MH&SU follow-up within 30 days. The five independent predictor variables were; community size, Indigenous, employment status, marital status, and ICD F Code diagnosis.

The full model containing all predictors was statistically significant; X^2 (10, N = 4401) – 264.474, $p < .001$, indicating the model was able to distinguish between patients who would have had a hospital readmission to those who would not have. However, the model only explained between 5.8% (Cox and Snell R square) and 8.0% (Nagelkerke R squared) of the variance in readmissions, and only correctly classified 65.7% of the overall cases.

As shown in Table 12 all five of the independent variables made a unique statistically significant contribution to the model (Community size, Indigenous identity, Employment status, Marital status, ICD F diagnostic code), as well as the second performance measure (Community MH&SU follow-up).

Some studies use Relative Risks (RRs) to describe results; others use Odds Ratios (ORs). Both measure association between a binary outcome variable and a continuous or binary predictor variable, and both are calculated from 2x2 tables; however, they are calculated and interpreted differently.

Logistic Regression generates Odds Ratios (and 95% confidence levels) for each variable or factor as the strength of association between the risk factors and the frequency of outcome. If the odds ratio is <1, the odds are decreased for an outcome; if the odds ratio >1, this means the odds are increased for an outcome. If the odds ratio =1, there is no association between the risk factor and the outcome.

The strongest predictor factor on hospital readmissions was ICD F Code Diagnosis F20-F29, Schizophrenia or Psychosis, recording an odds ratio of 2.316. This indicated that patients with this diagnostic group had two and one-third the odds of having hospital readmissions. This diagnostic group was followed by patients with F10-F19, alcohol or substance use diagnosis having an odds ratio of 1.699, meaning they were over one and a half

the odds to be readmitted. The third diagnostic group ICD F Code F30-30, depression, bi-polar and mood disorders had an odds ratio of 1.352, meaning this diagnosis group was less than one and a half times the odds to be readmitted, compared to the other diagnostic category, controlling for other factors in the model.

The second strongest predictor of hospital readmissions was if patients had an Indigenous cultural identity, with an odds ratio of 1.549. This indicated that the odds of patients identified culturally as Indigenous were one and a half times the odds to have hospital readmissions than patients who were not identified as Indigenous, controlling for other factors in the model.

The third predictor for hospital readmissions was the marital status of single-never married, with an odds ratio of 1.517. This indicated that patients who were single and had never been married were one and a half times the odds to have hospital readmissions than patients with other marital statuses, controlling for other factors in the model.

The fourth predictor for hospital readmissions was if the patient lived in a mid-size community, with an odds ratio of 1.275. This indicated that patients who resided in mid-size communities had slightly increased odds to have hospital readmissions than patients who resided in either rural or urban communities.

In contrast, the predictor with a negative (*B* value) association were patients who were employed had an odds ratio of .817, less than 1.0, indicating that patients who were employed had reduced odds to have hospital readmissions compared to patients who were not employed, controlling for other factors in the model.

Similarly, the second performance measure had a negative (*B* value) association to the first performance measure (hospital readmissions), which was patients who did not receive

Community MH&SU follow-up within 30 days had an odds ratio of .547, which is less than 1.0. This indicated that patients who did not have Community MH&SU follow-up had approximately half the odds to have hospital readmissions compared to patients who had Community MH&SU follow-up within 30 days.

The inverse association was patients who received Community MH&SU follow-up within 30 days had an odds ratio of 1.828. This indicated that patients who had Community MH&SU follow-up within the 30 days performance measure time had over one and three quarters times the odds of having hospital readmissions.

Overall, the classification predictions were unimpressive, with 89.5% of the non-readmissions, and only 22.8% of the readmissions being correctly predicted, for an overall prediction rate of 65.7%. Of the 2533 patients who did not to have a readmission, 296 (11.5%) were incorrectly predicted. In comparison, of the 1213 patients who were readmitted, the model only predicted 359 (22.8%) would be readmitted, for an overall average of 65.7% prediction.

Table 13 below shows the regression coefficients, Wald statistics, significance, odds ratios, and 95% confidence intervals for odds ratios for each of the five predictors, and the second performance measure.

Table 13 *Logistic Regression – Five Predictors & Second Performance Measure*

	B	S.E.	Wald	*df*	Sig. *p*	Odds Ratio 95% C.I. for EXP*(B)*		
						Exp*(B)*	Lower	Upper
HospitalCity.3 Groups: Rural	.014	.137	.010	1	.920	1.014	.775	1.326
HospitalCity.3 Groups: Mid-size	.243	.087	7.782	1	.005	1.275	1.075	1.511
Indigenous Identifier Yes. No	.437	.072	36.436	1	.000	1.549	1.344	1.785
Employment Status.2 Groups	-.202	.075	7.356	1	.007	.817	.706	.945
MaritalStatus.3 Groups-Single	.417	.075	30.932	1	.000	1.517	1.310	1.757
MaritalStatus.3 Groups-Other	.123	.093	1.748	1	.186	1.131	.942	1.357
ICDCodeGroup (1) F10-19	.530	.114	21.711	1	.000	1.699	1.359	2.123
ICDCodeGroup (2) F20-29	.840	.123	46.269	1	.000	2.316	1.818	2.951
ICDCodeGroup (3) F30-39	.301	.110	7.458	1	.006	1.352	1.089	1.678
Follow-up in 30 days-No	-.604	.071	72.613	1	.000	.547	.476	.628
Follow-up in 30 days-Yes				1	.000	1.828	1.592	2.101

a. Variable entered on step 1: Follow-up within 30 Days: No 0. Yes 1.

The results of the ANOVA statistical results and Post Hoc tests of the five independent variables or factors in relation to each of the two quality performance measures, and the Logistic Regression analysis of the model used in this research are the focus in the Discussion chapter. The results for each independent variable, and the predictive association

to the two quality performance measures are discussed in the context of literature on each of the factors.

CHAPTER 7

Discussion

The purpose of this research was to examine two quality performance measures used to evaluate the delivery of mental health and substance use programs using an atheoretical approach. The clinical and administrative data was collected from 18 hospitals located in communities across Northern British Columbia. The study used ANOVA and Post Hoc tests on five selected independent factors that had statistically significant differences with each of the two measures. Logistic regression analysis was also used to examine the influence of the five factors; as well as the two performance measures in relation to each other.

While statistically significant differences were evidenced for all five of the factors, often the effect size (eta Squared) of the variable was small. To better understand the meaning within each factor or variable, One-way ANOVA with Post Hoc tests were used to analyze the potential effect of each value label within the specific variables. This statistical analysis was explored in the previous Findings Chapter, while this chapter compares the results with relevant literature and considers potential implications.

First Quality Performance Measure – Hospital Readmission Rates

The Ministry of Health – Service Plan for 2018/19 to 2020/21 – Objective 1.3 is: "*Improved health outcomes and reduced hospitalization for those with mental health and substance use issues through effective community services.*"

The structure in this discussion section parallels the Findings Chapter by focusing on the first quality performance measure and the five variables examined in relation to it; then the second quality performance measure in relation to the same five variables.

Quality Performance Measure - one: The first quality performance measure by the Ministry of Health for the regional health authorities regarding hospital readmissions is defined as: *Reduce the percentage (number) of people (age 15 and over) hospitalized for a mental health or substance use disorder, who are readmitted to a hospital within 30 days of discharge.*

STATIC

Demographic – community the hospital is located, patient's age, and sex.

1. **Hospitalization Rates by Community Size.**

Hypothesis 1.1 *Patients residing in smaller rural communities will have higher mean numbers of hospitalizations in comparison to patients in larger communities with specialized services.*

When examining the hospitalizations rates by each community, the study found there was a variation in hospitalization rates between the 18 hospitals, from a low mean of 1.33 hospitalizations per patient up to 2.18 hospitalizations in the five-years of data. The hypothesis assumed that rural hospitals located in smaller communities would have higher readmission rates due to limited community services, compared to hospitals in larger urban centers with more specialized services. Related to this would be the other performance measure of longer wait times to access community MH&SU services, which could lead to more (re)hospitalizations. The hypothesis was not supported in the statistical analysis, as no statistically significant differences were determined for hospitalization rates between rural, mid-size and urban communities. It was not anticipated the mean rate of hospitalizations for rural communities would be very similar to urban centres, with mid-size communities instead having the highest hospitalization rates.

Literature on hospitalization rates from the United Kingdom, Australia, United States, and Canada showed 10% to 13% of patients who had been hospitalized for a mental health issue were readmitted not long after they were discharged from the psychiatric unit (Agency for Health Care Research and Quality (AHRQ), 2015; Canadian Institute of Health Information (CIHI), 2012; Leslie & Rosenheck, 2000; Madi, Zhao, & Li, 2007; Organisation for Economic Co-operation and Development (OECD), 2013; Thompson et al., 2004; Vigod et al., 2013a).

In 2003–2004, 37.0% of patients with mental illness discharged from acute care hospitals were readmitted within a period of one year, compared with 27.3% of patients discharged with a non-mental illness (CIHI, 2006; Madi, Zhao, & Li, 2002). CIHI's (2012) report on hospital mental health services in Canada for fiscal year 2009-2010 provided the rates of 30-day readmission rates for all 73 Health Regions in the 10 Canadian Provinces. The rates ranged from a low of 2.94 to a high of 20.31 rate per 100 people; almost a tenfold difference among the 73 health regions. The CIHI report also provided the one-year readmission rates for the same regions ranged from a low of 10.81 up to 45.31 per 100 people (CIHI, 2012).

Like the CIHI (2012) report, this study found a range in mean number of hospitalizations between the 18 acute care hospitals within the Northern region existed; from a low mean of 1.33 hospitalizations per patient, up to a mean of 2.18 hospitalizations during the five-year period. The range in hospitalization rates within Northern Health appear homogenous, and on the lower end of readmission rates when compared to the CIHI (2012) rates for other provinces and health authorities in Canada.

A further consideration is the means represent the number of hospitalizations patients had, but do not include the length of hospital stay (LOS) each patient would have had during each hospitalization. There is also the question of whether the increased hospitalizations led to improved care for the patient. Further studies comparing hospitalization rates of similar size hospitals to learn what the operational differences that influence the number of hospitalizations could be conducted to see if numbers of rehospitalizations could be reduced in communities with higher readmissions means. Another question is whether community mental health and addiction services have been rationalized on a model based on community sizes and population needs.

According to CIHI (2011, 2014) on average in Canada, one patient in eight has repeat three or more hospitalizations within a year for mental health reasons. However, these numbers vary from a low of one patient in 18 for health regions with available and quality community mental health care; to a high of one patient in five for health regions with limited or poor-quality community health care. A related factor is that repeat hospitalizations for mental illness are 13% higher for patients who live in poorer neighbourhoods or communities. Repeat hospitalizations highlight gaps in parts of the system, and show opportunities to provide an improved combination of services, treatments and supports (CIHI, 2011). One approach to do this was suggested by Lin, Or, Coldefy, Urbanoski, Seitz, Carlisle, Szatmari, and Kurdyak (2015), which is to conceptualize mental health and substance use related services, using a tiered model of care (Paxton, Shrubb, Griffiths, Cameron, & Maunder, 2000; Rush 2010). This tiered model is further discussed in relation to Hypothesis 2.1 in the community MH&SU follow-up section.

Socio-cultural – Indigenous cultural identity.

2. Hospitalization Rates by Indigenous Cultural Identifier.

Hypothesis 1.2 *Patients culturally identified as Indigenous will have higher mean numbers of hospitalizations in comparison to non-Indigenous patients.*

This study found the percentage of hospitalizations for individuals who culturally identified as Indigenous to be 24.5% of MH&SU patients, compared to 17.5% in the general population; resulting in an over-representation ratio of 1.4 times. In addition to being over-represented in the population percentage of hospitalizations, Indigenous patients also experienced higher numbers of rehospitalizations compared to non-Indigenous patients; and a significantly higher hospitalization rate (almost double) compared to patients whose cultural identity was unknown.

Research literature from the United States provided inconsistent results on statistical associations for ethnicity or race in relation to numbers of mental health hospitalizations. Depending on the study and the factors, as well as study population, the results could be contradictory for hospitalization rates of patients with European/Caucasian background compared to if patients with African American or Latino backgrounds. No American study on mental health rehospitalizations was located that identified a patient population that included whether the patients were Native American or Indigenous.

Similarly, no Canadian research on mental health hospitalizations was located that identified whether patients were Indigenous in relation to their hospitalization ratio compared to non-Indigenous patients. This is because Canadian hospitals use the Discharge Abstract Database (DAD) to gather data, but it does not include patients' cultural backgrounds for the reports to Canadian Institute of Health Information (CIHI).

This research study was able to determine whether hospitalized patients culturally identified as Indigenous or non-Indigenous by matching patient information from the community MH&SU MRR database to hospital DAD data. The study matched 87.5% of the hospital DAD clinical records to the community MH&SU MRR; a unique situation that does not exist in the majority of health authorities in Canada, the United States, or most countries, as mental health programs and substance use services in the community usually operate on separate clinical information systems.

A New Zealand study was located that had applicability to Canada as the research included an Indigenous cultural variable. This five-year New Zealand study on hospital admissions found that patients who experienced higher numbers of readmissions were more likely to be Māori (Indigenous) whose number of hospital admissions had a 1.37 incidence ratio compared to Europeans at 1.0. The authors found this disparity in hospitalisation rates emphasized the need for further investigation into how acute mental health services can more effectively meet the needs of Māori (Wheeler, Moyle, Jansen, Robinson, & Vanderpyl, 2011).

The findings of the New Zealand research on Indigenous hospitalizations were similar to findings in this research study. In New Zealand Indigenous individuals were over-represented in mental health and substance use hospitalizations compared to their population proportion; in addition, they experienced increased numbers of hospitalizations. Further exploration comparing cultural identity groups might provide a more delineated understanding on reasons for Indigenous over-representation and increased (re)hospitalization rate is solely in the North, or common across Canada. Further research could examine possible reasons for the admissions and subsequent readmissions, as well as the longer wait times to access community MH&SU follow-up post-hospitalizations.

Generally, reasons for an over-representation of Indigenous people experiencing MH&SU hospitalizations are understood, as epidemiological studies over the years have documented the high level of mental health needs in Canadian Indigenous communities (Kirmayer, 1994; Kirmayer et al., 1993; Kirmayer, Macdonald, & Brass, 2000; Roy, Choudhuri, & Irvine, 1970; Royal Commission on Aboriginal Peoples, 1995; Waldram et al., 1995). The corresponding high rates of suicide, alcoholism, violence, and pervasive demoralization that occur in Indigenous communities are direct consequences of a history of colonization, disruption of traditional cultural identity, and loss of connection to the land and spiritual history (LaFromboise, 1988; Roy et al., 1970; Waldram, 1997; York & Highway, 1990).

Smylie and Firestone (2015) stated that accurate, complete, and current data on Indigenous health status in Canada is lacking; however, they noted the National Collaborating Centre for Aboriginal Health (NCCAH, 2012) document, *The State of Knowledge of Aboriginal Health*, provides a depiction of Indigenous health in Canada. This document drew on research that focused on maternal, fetal, and infant health; child health; communicable disease; non-communicable disease; mental health and wellness; environmental health; food insecurity and nutrition; social problems; illnesses and deaths linked to misuse of alcohol and other drugs; accidents, poisonings, interpersonal violence, homicide and suicide; obesity, diabetes, hypertension, cardiovascular, and chronic renal disease (lifestyle diseases); and diseases caused by environmental contamination (Gracey, & King, 2009; King, Smith, & Gracey, 2009). Findings in the NCCAH (2012) report confirm that experiencing a history of colonialism and the resulting economic, social, and cultural marginalization has had profound health impacts on Indigenous peoples. The impact of these experiences across generations

has contributed to high rates of intergenerational trauma, substance use and mental health problems, suicide, incarceration, family violence, and involvement with criminal justice and correctional systems (Pugh, & Cheers, 2010; Sapers, & Zinger, 2012; Shields, 2013).

Indigenous people also experience challenges in obtaining timely access to appropriate mental wellness services, particularly in northern, rural, and remote communities. First Nations communities with resources to offer services locally often have difficulty recruiting and retaining qualified service providers (Mussell, Adler, Hanson, White, & Smye, 2011). To support healing from the inter-generational impacts of colonization, Indigenous people should have access to a continuum of culturally safe mental health and substance use services, delivered through a collaboration of mainstream and Indigenous organizations.

Socio-economic – highest education completed, and employment status.

3. Hospitalization Rates by Employment Status.

Hypothesis 1.3 *Patients with an employment activity will have lower mean numbers of hospitalizations than patients who were unemployed.*

Like other studies, this research found patients who were employed, or involved in a role or activity, had a lower mean number of hospitalizations. In contrast, patients who were unemployed or not seeking work, had higher rates of rehospitalizations. Patients who did volunteer activities related to providing peer support for other MH&SU patients, were the smallest group, but had the highest mean number of hospitalizations.

When the patient's employment category was known, patients with lower mean numbers of hospitalizations occurred when the patient was employed or in role such as a student, homemaker, or retired. In comparison, the categories with a higher mean number of

hospitalizations were for patients who were unemployed, so not seeking work or on disability. Patients who were volunteers had significantly more hospital admissions than either employed, or unemployed patients. In this study, "volunteers" are patients with serious mental illnesses who provide peer support, in comparison to volunteers in the general community.

A fourth group, patients with the smallest mean number of hospital admissions were missing information regarding their employment status. The employment data was missing due to them having less hospitalizations and not having community MH&SU follow-up, when their employment information would have been collected. As these patients had shorter stays and less hospital admissions, it is probable their mental health issues were less serious.

Research studies that included employment status as a factor in either the initial hospitalization or subsequent readmissions found that patients were more likely to be readmitted if they were unemployed (Clements, Murphy, Eisen, & Normand, 2006; Moran, et al., 2000; Schmutte, Dunn, & Sledge, 2009). The results of this study support other research and confirm there was a statistically significant association of patient's employment status to mean number of hospitalizations. Future research could look at the effects of various types of employment, or reasons for unemployment as they could provide readmission risk indicators for practitioners when developing patient discharge plans.

Family – marital status, household, living arrangement, parenting.

4. **Hospitalization Rates by Marital Status.**

Hypothesis 1.4 *Patients in a relationship will have lower mean numbers of hospitalizations than patients not in a relationship.*

This research provided new information on the effect of marital status and relationships regarding mean numbers of hospitalizations. Different from other research findings, this study found that patients who were either separated or divorced had the lowest mean numbers of hospitalizations in comparison to other relationship statuses. Patients who were married or in a relationship had a mid-range mean number of rehospitalizations. Like other research, this study confirmed that patients who were single and never in a relationship, had the highest mean numbers of hospitalizations. The hypothesis for this factor was not supported, as patients with the lowest mean number of hospitalizations were those who were separated or divorced. The patient group who were either married or in a relationship had been expected to have the lowest mean number of hospitalizations, instead had the second lowest mean.

Other research that considers the relationship factor only examined whether the parent was or was not in a relationship. This study created further categories of not being in a relationship into sub-categories of either being separated or divorced; which was then compared to single never in a relationship. Doing this demonstrated significant differences between the sub-categories of not being in a relationship. The finding was having previously been in a relationship (Separated or Divorced) was more protective a factor than previously assumed as this group had the lowest mean number of hospitalizations. In comparison, patients with the highest mean number of hospitalizations were those who were single and never married. The fact that patients who were Separated or Divorced had the lowest rehospitalization rate indicated that having been in a relationship then managing the outcome may result in the person being more self-reliant than a person who is Single and never in a relationship, or a person who is Married and in a relationship. The differences between being

Single and never in a relationship, compared to Separated or Divorced, on rehospitalizations have not been delineated in other studies.

Other studies have combined patients who were separated or divorced, with patients who were single and never married, when comparing them to patients who are married or in a relationship. Examples of this combining are, Kastrup's (1987) study that noted "revolving door" patients were younger and either single or divorced. Bernardo and Forchuk (2001) also found most psychiatric patients did not have a partner and were either single, separated, divorced, or widowed. Behr, Christie, Soderlund, and Lee (2002) further determined the only factor that provided a statistically significant protective effect for readmissions was being married or cohabiting, compared to being single. A hypothesis suggested by Behr, Christie, Soderlund, and Lee (2002) to explain this was; 1) the ability to maintain a partnership may either indicate either the patient has a less severe illness, or 2) having a cohabiting partnership confers a protective effect due to support from family structures.

The finding in this study about marital status supports part of Behr, Christie, Soderlund, and Lee's (2002) hypothesis with a modification. The information about Separated or Divorced, compared to being Single/never in a relationship, shows there is a difference between these categories, rather than them being similar. This difference illustrates that having been in a relationship appears to be a protective factor, as patients with the highest mean number of hospitalizations were single and never married. In addition, having been through a relationship may result in the individual developing more self-reliance than either being single, or currently being in a relationship. This is reflected in the statistic showing patients who were Separated or Divorced had the lowest rehospitalization rate of the three marital status groups. The differences in hospitalization rates of patients who were Single and

never in a relationship, compared to Separated or Divorced, was not delineated in most studies. This information supports the importance of identifying patients' current relationship status as a significant factor, in the context of the need for protective social strengths, when looking at risk influences for hospital readmissions.

Diagnostic – criminal justice involvement, ICD diagnostic F codes.

5. **Hospitalization Rates by ICD Diagnostic F Code groups.**

Hypothesis 1.5 *Patients with ICD Schizophrenic Diagnostic F Codes for their initial hospitalization will have higher mean numbers of hospitalizations in comparison to patients diagnosed with other ICD F code categories.*

Four ICD Diagnostic F Code categories were examined to determine whether this hypothesis was supported. F10-F19 – Alcohol & Substance use, F20-F29 - Schizophrenia & Psychosis, F30-F39 - Bipolar & Depression, and F40-F49 – Anxiety & Adjustment Disorders. The findings were that F20-F29 - Schizophrenia & Psychosis diagnostic category did have the highest mean numbers of hospitalizations, which supported the hypothesis and aligned with other research studies.

Hendryx et al. (2003) and Schmutte, et al. (2009) both reported rehospitalization rates varied significantly by diagnosis and found schizophrenia and psychotic disorders were the most likely diagnostic group to be readmitted, with depression being the least likely. They also commented that diagnosis by itself was not predictive of readmission during the one-year follow-up period in their study, but found having a secondary substance abuse diagnosis was predictive (Hendryx, 2003). Some studies that examined the use of diagnosis to predict

readmissions produced mixed results as a diagnosis is not the same as severity of the illness (Lyons, 1997).

The findings in this study examined only the primary diagnostic reason for hospitalizations, and did not include secondary diagnostic factors. As well, the findings are based on the diagnostic F Code the treating physician determined on the day of discharge from a hospital as the primary reason for the hospital stay. Patients' diagnostic ICD F code categories and rates of readmissions for each category could have potential significance for practitioners when looking at optimal lengths of stay (LOS) for treatment of each diagnostic cluster to reduce patient readmissions.

Second Quality Performance Measure – Community MH&SU Follow-up

The Ministry of Health – Service Plan for 2018/19 to 2020/21 – Objective 1.3 is: "*Improved health outcomes and reduced hospitalization for those with mental health and substance use issues through effective community services."*

The structure in this discussion section parallels the Findings Chapter by focusing on the first quality performance measure in relation to the five variables; followed by the second quality performance measure in relation to the same five variables.

Quality Performance Measure - two: The second quality performance measure by the Ministry of Health for the regional health authorities regarding community follow-up is defined as: *Increase the percentage (number) of people (age 15 and over) who had been hospitalized for a mental health or substance use disorder, to receive community MH&SU and/or physician follow-up within 30 days of discharge.*

STATIC

Demographic – community hospital is located, patient's age, and sex.

1. **Community MH&SU Follow-up by Community Size.**

Hypothesis 2.1 *Patients residing in smaller rural communities will have longer wait times to access community MH&SU follow-up in comparison to patients in larger communities with specialized services.*

The literature review did not find studies that examined wait times to access community-based mental health and substance use services following discharge from hospitals. While a number of articles referred to the importance of community care supports to reduce readmissions (Behr, Christie, Soderlund, & Lee, 2002; Klinkenberg & Calsyn, 1996; Romansky, Lyons, Lehner, & West, 2003; Sullivan, Welles, Morgenstern, & Leake,

1995; Yamada, Korman, & Hughes, 2000), none specifically measured wait-time differences between communities to see whether the length of time to access post-discharge support had a relationship to readmission rates. This gap in research from the United States is understandable as their managed care systems, HMOs, and multiple payor plans, would make it difficult to obtain comprehensive community MH&SU follow-up information to make jurisdictional comparisons.

In this study the 18 communities in Northern British Columbia where hospitals are located were categorized into three community sizes; Rural, Mid-Size, and Urban. The three sizes of communities were then compared to groups of wait days before community MH&SU follow-up contact occurred. The following groupings of days were used for the calculations; 1 = 0-3 days, 2 = 4-7 days, 3 = 8-15 days, 4 = 16-30 days, 5 = 31-60 days, and 6 = 61-365 days.

The results for this measure were very different when compared to the influence of the three community sizes on numbers of rehospitalizations. In this case, the wait time measure was statistically significant based on the size of the community. For this variable, the hypothesis was upheld, as Rural communities had the longest mean grouped wait times to access community MH&SU services (range of 16-30 days). Fitting the premise of the hypothesis, Mid-Size communities had an in between mean grouped wait time (roughly 2 weeks); and Urban communities had a statistically significant shorter mean grouped wait time (8-15 days) compared to the other two community sizes.

The finding on community sizes supports Jensen, McLaughlin, and Slack's (2003) research on differences in health service usage between urban and rural areas. Possible reasons for this include rural communities often have a limited number of community

MH&SU staff who do generalist or non-specialized roles when providing follow-up services. In some rural communities these staff are part of Primary Care Interdisciplinary teams, who receive referrals from Family Physicians, as well as referrals from the local hospital. Compounding this is whether the small number of community MH&SU positions in rural communities were vacant due to recruitment issues. Thomas, MacDowell, and Glasser (2012) found there is a persistent shortage of mental health and health care professionals in northern and remote areas due to staff turnover.

Residing in rural and remote communities also means living a distance from health care and mental health facilities and services, and a limited range of services, even if needed (Bodor, 2009; Elliot, 2000; Harvey, 2009; Hoyt, Conger, Valde, & Weihs, 1997; Judd et al., 2006; Morton, 2003). When northern and remote areas are better served, people will not have to travel as often to other communities or other jurisdictions; although some travel will be unavoidable if people need to access specialized or tertiary level services (MHCC, 2012).

In comparison Urban communities had the shortest mean grouped wait times to access community MH&SU follow-up services. They also had hospitals with inpatient psychiatric units, and specialized community MH&SU services and teams. Most Urban communities had Intensive Case Management Teams (ICMT), or Assertive Community Teams (ACT), as well as specialized Adult Short-Term Assessment and Treatment (ASTAT), or Adult Community Services (ACS) for patients with complex mental health or substance use issues. In addition to these specialized MH&SU services, the Urban communities also had Primary Care Interdisciplinary Care Teams. Urban communities with these services had overall follow-up wait times in the shorter follow-up range of 8-15 days.

Mid-Size communities generally provided community MH&SU services in a similar structure to Rural communities; e.g. mental health and substance use staff being part of Primary Care Interdisciplinary Care Teams; however in addition, they could have one or two staff that provide specialized MH&SU functions, liaising with the hospital to assist with discharge planning and connecting the patient to community services.

Overall, the mean grouped wait times indicated when community MH&SU follow-up contact occurred, the average for the 18 communities was within the 30-day performance measure; however, the range of time this contact took varied from a low of 7-8 days, up to almost 30 days. For patients, this meant depending on which community they resided, they could access community MH&SU follow-up as quickly as one-week, more typically within two-weeks, or might have to wait up to four weeks. The findings evidenced that communities with specialized community MH&SU services had the shortest follow-up times, whereas small communities with few or no specialized MH&SU services had longer wait times for patients to access community MH&SU follow-up.

These differences in mean grouped wait times for access show the allocation of MH&SU staffing in the North does not meet three of the five Principles of the Canada Health Act (1984). Universality requires all residents be entitled to the same level of health care, and Accessibility which requires insured services be provided on uniform terms and conditions on a basis that does not impede reasonable access to insured services, and Comprehensiveness which includes medically necessary services for the purpose of maintaining health, preventing disease, or diagnosing or treating an injury, illness or disability. Providing more specialized mental health and substance use staff in Mid-Size and Rural communities would help meet

these three principles, and reduce wait times patients in the smaller communities are experiencing to access services.

One approach suggested by Lin, Or, Coldefy, Urbanoski, Seitz, Carlisle, Szatmari, and Kurdyak (2015) is to conceptualize mental health and substance use related services, using a tiered model of care (Paxton, Shrubb, Griffiths, Cameron, & Maunder, 2000; Rush 2010). There are three key features of this approach that would help with the allocation of services. First is using problem severity, as opposed to diagnosis, as the criteria for organizing services. In mental health, levels of need are conceptualized as either 1) severe/complex, 2) moderate, or 3) mild, including transient problems (Rush, 2010). For substance use disorders, problem severity is multidimensional and encompasses acuity, chronicity, and complexity (Paxton et al. 2000). The second feature is to characterize services in terms of functions, rather than specific programs. These functions include, education, screening, assessment, referral, planning and providing treatment and intervention, crisis stabilization, and community supports such as housing or occupational training. The third feature is matching these functions to individuals' levels of need; creating "tiers" of functions (Rush, 2010).

For example, most people may only need education about the signs of mental health or substance use problems, and screening for early detection though Primary Care (the lowest tier). Others may need a range of functions including screening, assessment, crisis stabilization, and interventions by non-medical community services (the middle tier). Others will need more intensive care in hospital-based day programs, hospitalizations, or involuntary treatment (the highest tier). Using a tiered model provides a framework that can be based on the population of a region, or communities, in terms of problem severity, anticipated service

costs, expected participation in community services, and the need for specialized or intensive services

Two concerns about tiered models have been raised in the literature. First, coordination across functions is a concern, particularly for individuals with severe or complex problems (Goldman et al., 2002; Rosenheck et al., 1998; Rush, 2010). In addition, the requirement for individuals to move from more to less intensive services as their condition changes is important to not use services inappropriately or have them blocked. Secondly, the way functions are mapped to providers or agencies and organizations is not prescribed. Rush (2010) noted the existence of "tier trap," when a service is limited to a single tier despite its provision of multiple functions that would cross tiers.

There is a related issue of what kind of training or specialization would be required for the different service functions. The trend in health care is to provide more comprehensive and complete care (e.g., by working in multidisciplinary primary care teams), and to control costs (e.g., provision of care by less expensive health professionals such as health care aids). In addition, there are technologies and intervention modalities (e.g., telepsychiatry and phone consultations with primary care physicians about care plans and new medications) that need to be considered when allocating mental health and substance use services based on a tiered model to communities of varying sizes across a region or health authority (Rush, 2010).

Socio-cultural – Indigenous cultural identity.

2. **Community MH&SU Follow-up by Indigenous Cultural Identifier.**

Hypothesis 2.2 *Patients culturally identified as Indigenous will have longer wait times to access community MH&SU follow-up in comparison to non-Indigenous patients.*

No literature was located that examined the wait times Indigenous people experienced when accessing community MH&SU follow-up services post-hospital discharge. The findings in this research indicated statistically significant differences in follow-up access times depending on whether the patient was culturally identified as Non-Indigenous, Indigenous, or their cultural identity was Unknown/not asked.

The cultural identity group with the shortest wait for community MH&SU follow-up services was Non-Indigenous patients who had a grouped wait time of 4 to 7 days. In comparison, patients with an Indigenous cultural identity had a grouped wait time of 8 to 15 days for community MH&SU follow-up; almost a week longer. These findings supported the hypothesis. The third group, whose cultural identity was Unknown/not asked, had a slightly longer grouped wait time, but in the same range as Indigenous patients.

These results raised questions as to why patients who were culturally identified as Indigenous, experienced up to two weeks wait to access community MH&SU follow-up; especially as they had the highest mean numbers of hospitalizations. In contrast, Non-Indigenous patients were seen within a week of their hospital discharge, and had a lower mean number of hospitalizations. The third group, patients whose cultural identity was Unknown/not asked, had a similar mean grouped wait time as Indigenous patients to access community MH&SU services, but had the lowest mean rehospitalization rate of the three cultural identity groups.

The patterns of over-representation in hospitalizations, higher readmission rates, plus longer wait times to access community MH&SU services by Indigenous patients occurred consistently in all 18 communities across the North. One possible reason for longer wait times experienced by Indigenous patients might be the distance or remoteness of their home

community to where MH&SU services are located. For example, wait times for community MH&SU follow-up services in Fort St. James might be longer for Indigenous people due to travel from their home communities of Tachie (one-hour drive), or Yekooche (two-hour drive). More extreme distances occur for residents of Tsay Keh Dene (12 hours), and Kwadacha (14 hours) to Prince George, the closest community for MH&SU follow-up services. These travel distances can also be complicated by weather and driving conditions that can cause further delays. (It should be noted for these two communities, a specialized MH&SU outreach program was started after the research data was collected. There are similar MH&SU outreach teams being implemented to serve other First Nations communities across the Northern Health region in partnership with the First Nations Health Authority).

Socio-economic – highest education completed, and employment status.

3. **Community MH&SU Follow-up by Employment Status.**

Hypothesis 2.3 *Patients with an employment activity will have longer wait times to access community MH&SU follow-up than patients who were unemployed.*

No literature was located that examined patients' employment status in relation to the length of wait time they experienced when accessing community MH&SU follow-up services post-hospital discharge. This research indicated there was no statistical significance regarding community MH&SU follow-up grouped wait times in relation to patients' employment status. Based on this, the hypothesis was not supported.

Although there were no statistically significant findings, patients known to MH&SU services (e.g. Volunteers, Peer Support Workers) had the shortest mean grouped wait times to access services. This made sense as they would have had a prior relationship with MH&SU

services so quicker access. However, for most patients, their employment or unemployed status had limited effect on their grouped wait time as most accessed community MH&SU services within the second week after hospital discharge. However, those who were employed had a slightly shorter mean grouped wait time than those who were unemployed. It was unexpected that patients who were unemployed, so possibly on sick leave or disability pensions, had the longest mean grouped wait time to access MH&SU follow-up services. This result was contradictory to the hypothesis, which assumed their higher needs would correlate with receiving quicker follow-up than patients who were employed. One possible reason for this inverse association was employed patients were motivated to return to work, so accessed MH&SU services more quickly than patients who were unemployed and did not have the same motivation; although the difference in grouped wait times was not significant.

Family – marital status, household, living arrangement, and parenting

4. Community MH&SU Follow-up by Marital Status.

Hypothesis 2.4 *Patients in a relationship will have longer wait times to access community MH&SU follow-up than patients not in a relationship.*

No research regarding patients' marital status in relation to community MH&SU follow-up post-hospitalization was located. The literature on hospitalizations described possible correlations between patients' marital status and the number of hospital readmissions they had, but no research examined patients' marital status in relation to wait times to access community MH&SU services post-hospitalization.

This study found the marital category with the expected shortest mean grouped wait time for to access community MH&SU follow-up were patients who were Single and Never

Married. However, the relationship category with the longest mean grouped wait time to access community MH&SU services was patients who were Divorced or Separated. The marital group Married or in a Relationship, that had been expected to have the longest wait time, instead had a mid-range mean grouped wait time. This finding did not support the hypothesis that patients who were in a relationship would have the longest mean grouped wait time to access follow-up services. These findings differ from other research that solely looked at whether the patient was in a relationship or not. This research differentiated three groups; being single and never in a relationship, from being separated or divorced so having been in a relationship, plus the third category of being Married or in a relationship.

When comparing the three relationship categories with the two performance measures; rates of hospitalization, and mean grouped wait times to access community MH&SU services, the following pattern was evidenced. Patients who were Single and never in a relationship had the highest mean number of hospitalizations, and the shortest mean grouped wait time to access community MH&SU follow-up services. Patients who were Married or in a relationship had means in the mid-range for both performance measures. The third relationship group, Separated or Divorced, had the lowest mean numbers of hospitalizations, and the longest mean grouped wait time to access community MH&SU services. These results were unexpected as the literature that looked at the effect of relationships on rehospitalizations examined whether patients were or were not in a relationship.

These findings indicate the system understands (based on other research) that patients who are Single and never in a relationship are more at risk of rehospitalization, so are provided quicker access to community MH&SU follow-up. However, it was unknown that patients who were Separated or Divorced would have the lowest rehospitalization rate, so

theoretically less at risk; yet had the longest mean grouped wait time to access community MH&SU services. There is possibility that having been in a relationship could be a protective factor. For example, having been through a relationship, then being on your own, could result in the patient having developed more self-reliance than a patient who is either single or in a relationship. This greater self-reliance could be a reason this group were not in as urgent need to access community MH&SU services, and waited longer to access the services.

Based on the literature it had been assumed there would not be a significant difference between being Single never married, to being Separated or Divorced; rather they would have similar findings. Instead, statistically significant differences between the two relationship categories were demonstrated with this performance measure as well. Further research on understanding the reasons for these differences is needed.

Diagnostic – criminal justice involvement, and ICD diagnostic F codes.

5. **Community MH&SU Follow-up by ICD Diagnostic F Code Group.**

Hypothesis 2.5 *Patients with ICD Schizophrenic Diagnostic F Codes for their initial hospitalization will have shorter wait times to access community MH&SU follow-up in comparison to patients diagnosed with other ICD F code categories.*

The studies used in the literature review of this research found examining the mental health diagnoses to predict readmissions produced varying results as a diagnosis is not the same as severity of illness. The literature also noticed a confounding factor was if patients had co-occurring or secondary substance misuse issues as that often increased the rate of hospitalizations regardless of the mental health diagnosis. This study only examined the primary diagnostic reason for hospitalizations, and did not include the influence of secondary

or co-occurring illnesses. The studies that were located focused on hospital readmission rates. No articles were located that examined wait times to access community MH&SU services post-hospitalization, in relation to ICD Diagnostic F Code categories for hospitalization.

This study found statistically significant differences in mean grouped wait times to access community MH&SU services following hospital discharge for each of the four ICD Diagnostic F Code categories. The ICD diagnosis with the shortest wait to access community MH&SU services was; F20-F29 - Schizophrenia & Psychosis, with the shortest mean grouped wait time (4-7 days) to receive services. This finding supported the hypothesis. In addition, having priority access for this diagnosis is supported by this category having the highest mean number of readmissions.

The next two ICD F Code diagnostic clusters had mean grouped wait times that were similar to each other, which aligned with their hospital readmission rates. These were; F30-F39 - Bipolar & Depression, and F40-F49 – Anxiety & Adjustment Disorders, both with mean grouped wait times in the 8-15 days range to access community MH&SU follow-up services. Both diagnostic clusters also had lower readmission rates than F20-F29 - Schizophrenia & Psychosis. These findings align with the literature that looked at rehospitalization rates for schizophrenia and psychosis. This diagnostic category is viewed as having the greatest likelihood for rehospitalizations due to the severity of the illness, so most in need of specialized community follow-up services.

Thompson, et al. (2003) looked at differentiated schizophrenia and schizoaffective disorder as separate categories, and reported those with schizoaffective disorder were almost twice as likely to be readmitted as those with other schizophrenic disorders. Irmiter, et al. (2007) reported patients with a schizophrenia diagnosis were more likely to be rehospitalized,

as did Weiden and Glazer (1997). Schmutte, et al. (2009) reported psychotic disorders were more likely to be readmitted than "other disorders," or non-psychotic affective disorders. Bobo et al. (2004) also reported the presence of psychosis, or non-bipolar mood disorder, was predictive of readmissions. Several of these studies found that patients with increased numbers of admissions were likely to also have a substance abuse disorder. They found co-morbid substance abuse was not predictive; however, having a history of substance abuse was predictive of rehospitalizations.

The fourth ICD F Code diagnostic cluster had the longest mean grouped wait time to access community MH&SU services, was F10-F19 – Alcohol & Substance use, with wait times of 16-30 days before follow-up occurred. Further examination is required to correlating this diagnostic cluster to other factors on why this diagnosis had the longest mean grouped wait time to access community MH&SU services. There are several possible reasons. One might be that alcohol and substance use treatment services have historically been a separate service stream from mental health services. While they have been integrated within Northern Health, there are numerous addiction treatment programs that are either community-based or residential, that are not part of the health care system. Some of these services are provided by private for-profit agencies, others by community groups, and others are specialized services for Indigenous people provided by the First Nations Health Authority. It is possible that the over-representation of Indigenous patients and the limited number of specialized treatment options, delay access to local community follow-up services. Due to the variety of options, there is not a standardized transition process for addiction referrals. Instead, patients may be put on wait lists to access treatment services and only access community MH&SU follow-up if they cannot access other services in a timely way.

A related possibility for the delay for patients with alcohol and substance use issues who were hospitalized, is they would have complex treatment needs for which there are limited treatment resources. A further consideration is stigma about addiction and substance use issues may lead to denial about severity of the illness and reluctance to seek help. Regardless, having extended wait times for patients with alcohol and substance use issues to access services is a concern given the ongoing opioid crisis that has been identified as a public health emergency.

Two Quality Performance Measures Association

Modifiable Outcomes – community MH&SU follow-up by hospitalizations

MODIFIABLE

Hospitalization Rates by Community MH&SU Follow-up Measures.

3.1 Patients rehospitalization rates will be statistically associated with whether patients received community MH&SU follow-up within 30 days.

3.1 Rehospitalization Rates by Community MH&SU Follow-up.

As mentioned in the introduction, of the 5159 patients hospitalized during the five-year period, 4512 (87.5%) had contact with community MH&SU at some point during the five-year period, while 647 (12.5%) did not. This 87.5% match of hospital DAD clinical records to community MH&SU records provided a unique research opportunity. Most health authorities in Canada, the United States, and other countries, operate separate mental health programs from substance use services. The result is these programs and services use separate clinical information systems. Due to these separations, it is difficult for researchers in most jurisdictions to obtain significant levels and types of community follow-up data that includes both service streams, as well as levels of programs.

In comparison, in 2010, Northern Health Mental Health and Substance Use services (MH&SU) had the opportunity to restructure and integrate mental health and substance use services across the region for all levels of care (in all 18 communities, residential and treatment facilities, and hospital units). The result was Northern Health was the only health authority in the province (in Canada according to Accreditation Canada, and Dr. Brian Rush, both of whom did on-site visits), to have fully integrated mental health with substance use services in all communities and programs across the region. Based on the integration, Northern Health became the pilot health authority to implement the newly developed provincial MH&SU Minimum Reporting Requirements (MRR) clinical information system. Using this system helped support the integration, as all MH&SU clinicians and physicians in Northern Health began using the one system. Having this integrated MH&SU clinical information allowed factors to be extracted to be analysed in relation to data from the hospital-based DAD system. The result allowed examination of the two quality performance measures to determine their statistical association, and of selected factors that might have influence on either measure.

The intersection of the two quality performance measures, hospital readmissions within 30 days, and community MH&SU follow up within 30 days, was analysed using Logistic Regression to determine whether they were predictive; and if so, the strength of their association. In addition, the analysis model examined the influence of five independent factors. As discussed in the Literature Review, the premise behind these two quality performance measures is, if community MH&SU follow-up occurs within 30 days post hospital discharge, this support should reduce hospital readmissions that occur within 30 days.

The study found a statistically significant association between the two performance measures; however, the results had an unexpected inverse association to the premise they are based on.

As described in the Findings section, the community MH&SU follow-up performance measure had a negative association with the hospital readmission performance measure. Patients who did not receive community MH&SU follow-up within 30 days had an odds ratio of .547 (approximately half the odds) of hospital readmissions within 30 days. The inverse association was that patients who received community MH&SU follow-up within 30 days had an odds ratio of 1.828 (over one and three quarters times the odds) of hospital readmissions within 30 days; opposite to the premise the measures are based on.

The Rationale and Literature Review sections confirm that health care organizations accept the premise that increased community MH&SU follow-up post-hospitalization results in longer stays in the community, which in turn reduces rates of rehospitalizations within 30 days. This view is held by the US National Association of State Mental Health Program Directors, who have conducted studies based on the view that rapid readmissions indicate failures along the continuum of care that could be corrected by improved assessments, discharge planning, care transitions, and provision of appropriate levels of community services (NASMHPD, 2015).

Durbin, Lin, Layne, and Teed's (2007) review of the literature questioned this premise when they found "Early return to hospital is a frequently measured outcome in mental health system performance monitoring yet its validity for evaluating quality of inpatient care is unclear" (p. 137). Their review of articles indicated risk is greatest in the 30-day period immediately after discharge, but there was only modest support that attending programs to stabilize clinical condition and prepare patients for discharge would protect against early

readmission; and individuals with multiple previous admissions were at elevated risk for an early readmission. Durbin et al. (2007) conclusions align with some of NASMHPD (2015) recommendations, such as using standardized measurements of patient status at time of hospital discharge, plus the need for further studies on discharge practices. Durbin et al. (2007) also suggested that studies focusing on community post-care should occur as well, given when a patient is discharged the responsibility for prevention of readmission shifts from the hospital to the community care providers.

The findings in this study provide further information on the premise of inter-connected systems between hospitals and community MH&SU services. These findings initially appear counter-intuitive to the premise that the two quality performance measures are based on; however, there are possible reasons for these results. One is patients who did not receive community MH&SU follow-up within 30 days might have less severe mental health or substance use issues; and due to their illnesses being not as severe, would have fewer hospitalizations. Related to this is patients can attend other follow-up services in the community also appropriate to their service needs, rather than community MH&SU. These services could include seeing private practice counsellors or Employee and Family Assistance Program (EFAP) service providers. Other options are follow-up with Primary Care physicians who are working within supportive Integrated Care teams, and /or primary care networks. Youth could see Ministry of Children and Family Development Child and Youth Mental Health counsellors; older patients receive home support or residential care services; and Indigenous patients be provided care at First Nations health centres or agencies. In addition, patients with primary or co-morbid addiction and substance use issues, could attend day treatment programs, or residential treatment centres.

Another perspective is that patients seen by community MH&SU within 30 days have higher rates of hospitalizations is they likely had more serious or chronic mental health and substance use issues, so required specialized MH&SU services. Having more severe or enduring mental health or substance use illnesses increases the likelihood of higher rates of hospital readmissions occurring. Related to this is the inherent assumption in the second quality performance measure, percentage of patients who received community follow-up within 30 days. The measure's premise assumes shorter wait-times for patients to access community services will reduce readmissions. However, longer wait times might be more reflective of the limitations of the capacity and lack of resources in the communities, rather than being reflective of patients' conditions and needs to access community resources to prevent readmissions. Future studies could relate wait times to community size and remoteness, as well as available resources in those communities, that incorporate patients' clinical condition or need for services in the wait time prioritization.

A gap in this study (and studies in the literature) was the diagnostic and clinical information obtained did not include a severity scale to measure the illness when patients were hospitalized. If scales had been used, the hypothesis about patients with more serious illnesses being referred to community MH&SU in comparison to other health care services in the community could have been examined. While some hospitals use screening tools and psychometric measurements, they are generally site or program specific, and not nationally recognized for use. Future research on this topic would benefit if nationally agreed to standardized instruments were implemented to rate the severity of patients' mental health and substance use illnesses during their hospitalization, initially at time of admission, and subsequently at time of discharge.

A suggestion from this research is to implement collaborative discharge processes in hospitals which are connected to Primary Care homes and supported by specialized community MH&SU programs to better serve patients' needs. Establishing in-reach/out-reach processes between community programs and hospital wards would provide a continuum of care for all patients hospitalized for MH&SU issues. Establishing these processes and using specified criteria for follow-up referrals could lead to improvements in service quality and reductions in readmissions, compared to focusing on specific sub-populations and risk factors. This suggested option is described in the next section, recommendations for service changes.

Recommendations for Service Changes

The two quality performance measures; hospital readmissions within 30 days, and community follow-up within 30 days, are used in British Columbia and Canadian health care organizations that provide services for patients with mental health and substance use illnesses. The premise behind these measures is when readmission rates are relatively high, they are an indicator of sub-optimal health care system performance (CIHI, 2011; Ortiz, 2019; Shuster, Hurlburt, Tam, & Staples, 2018). There are also risks and inconveniences for patients who return to hospital, as well as increased costs to the health care system. The fact that readmissions affect patients and are costly, should motivate physicians, clinicians, hospitals, and health authorities to institute programs to monitor and reduce unplanned hospital readmissions by providing required services in the community.

The issue with the measures is that research has not evidenced a standardized intervention tool that is successful in reducing unplanned mental health and substance use hospital readmissions across settings and locations, nor justified when readmissions are appropriate. As described in the literature review, some multiple-component interventions and clinical profiles have shown promise, but their success has generally been for specific sites, programs, or patient populations, which makes them difficult to replicate in other settings.

An alternative approach for clinicians and administrators aiming to reduce unplanned readmissions, would be to implement collaborative discharge processes in hospitals that are connected to Primary Care homes, which are supported by community MH&SU programs; to establish a continuum of care for all patients who were hospitalized for MH&SU issues, rather than focus on specific sub-populations. Establishing a standardized process would help to

make discharge planning more defined, support inpatient care, and ensure patients' transition to levels of community services are clinically determined. In addition to hospital and community physicians and health care professionals working together, patients, their family members and social supports should be included in developing these plans, which will help minimize the risk of readmission.

Discharge plans should summarize the patient's diagnosis, medications, suggested treatment plan, recommendations for follow-up care, support network and services, plus options should a crisis occur. Everyone involved, the patient, family and supports, Primary Care physician, and community MH&SU services, would have a copy of the discharge plan to ensure there is a common understanding. A fundamental aspect would be to ensure patients with mental health and substance use issues have a pre-scheduled appointment with their Primary Care physician, plus community MH&SU program as appropriate, arranged before discharge.

Currently there are numerous hospitals and ward specific discharge plans and tools, but no national, provincial, or health authority wide standardized processes that encompass hospital discharge planning with Primary Care and community MH&SU services. To this end, the Mental Health and Substance Use program in Northern Health developed a Discharge Planning - Decision Support Tool (DST) to implementation in pilot hospitals and communities. To support the decision process on needed resources and supports, clinical criterion was developed using 'Standard' and 'Complex' definitions to guide patient service decisions. These processes were aligned with the Ministry of Health focus on Primary Care physicians and integrated care teams, supported by specialized community MH&SU services.

Proposed Discharge Planning Process

When patients are admitted to generalized acute care hospitals it may be unknown whether the patient's mental health or substance abuse issues are primary or secondary in relation to their medical needs. As well, ICD diagnostic reasons for admission can shift as diagnoses emerge during the patient's hospital stay. Given this, a broader approach is needed to identify patients who might need mental health and substance use services, who might not solely meet the performance measure criteria. This proposed process aims to increase the linkage of hospitalized patients to follow-up care either by Primary Care physicians, Interdisciplinary teams, or with specialized MH&SU services such as, day treatment programs, Intensive Case Management (ICM) Teams, Assertive Community Teams (ACT), First Nations MH&SU Mobile Support Teams, and Addiction treatment centres.

The process is supported by community MH&SU clinicians who would do 'in reach' by attending hospitals on a daily basis for referrals. The clinician, preferably a Registered Nurse or Registered Clinical Social Worker, should have specialized training in mental health and substance use assessments, diagnoses, and treatment planning, as well as knowledge of community programs and services for post-discharge care. Referrals to the MH&SU clinician would be made by hospital physicians, nurses and care providers, who identified patients with mental health or substance use issues who require an assessment to determine community MH&SU follow-up. Having the community MH&SU assessment and intake occur during the hospital stay provides information that supports inpatient care, plus helps with transition planning by establishing a discharge plan with linkages to appropriate community services. Doing this earlier following hospital admission has the potential to decrease hospital lengths

of stay, reduce readmission rates, and ensure appropriate community supports and care are pre-arranged at the discharge.

Specific implementation processes have been identified to achieve these aims, which includes MH&SU clinicians attending hospitals each day. This potentially would increase numbers of referrals to community MH&SU as it includes secondary and situational reasons outside the "primary" ICD diagnostic criteria the performance measure is based on. However, MH&SU clinical involvement in the hospital with assessment and discharge planning may shorten the patient's Length of Stay (LOS), as stays can be longer due to physician reluctance to discharge without assurance that a follow-up plan is in place.

Hospital referrals, assessments, intake and screening processes could use the DST 'Standard' or 'Complex' criteria to ensure referrals are made to appropriate service levels. The development of discharge criteria is supported by Vigod et al. (2015) as they identified medical comorbidity is a risk factor, plus the overall complexity of a patient as an important consideration when planning post-hospital transition to community care.

Table 14 *Decision Support Tool (DST) 'Standard' or 'Complex' Care Plan*

STANDARD non-complex MH&SU CARE PLAN CRITERIA If YES to STANDARD CRITERIA - Complete PRIMARY CARE Follow-up Service Plan	**COMPLEX** MH&SU CARE PLAN CRITERIA If YES to COMPLEX CRITERIA - Complete COMMUNITY MH&SU Follow-up Treatment Plan
STANDARD CRITERIA • Patient requires uncomplicated support or intervention from Primary Care, and one agency for their MH&SU needs. • Patient is able to self-manage their mental health or substance use problems. • Patient has an active engaged informal support network. • Patient poses little danger to themselves or others. • Patient is likely to maintain appropriate contact with support services for their MH&SU needs (e.g. AA, NA, EFAP) *Dr. Candida Graham & James Campbell*	**COMPLEX CRITERIA** • Patient has multiple MH&SU care needs requiring inter-agency & multi-disciplinary co-ordination. • At time of preparing discharge care plan, patient is experiencing severe mental illness which requires interventions and case management. • Patient has mental health diagnosis that co-exist (co-morbidity) with substance misuse (e.g. drugs, alcohol). • Patient presents as potential risk to themselves or others because of mental health problems and/or poor compliance with treatment. • Patient likely to disengage from MH&SU services in unplanned way.

- Patients with ‘Standard’ or “non-complex” care needs would be linked to Primary Care physicians, Interdisciplinary care teams, community support services, First Nations community health centres, and private services like EFAP.
- Patients with ‘Complex’ care needs would be connected to Primary Care teams, and referred to community MH&SU specialized services supported by Psychiatrists, Psychologists, Neurologists, and Addiction Specialist physicians; as well as specialized MH&SU programs such as, Intensive Case Management (ICM) Teams, Assertive Community Teams (ACT), First Nations MH&SU Mobile Support Teams (MST), Addiction treatment centres, and residential facilities.

This DST process and the Standard and Complex criteria was trialed at selected Northern hospitals and communities over a three-year period. Historically on average, the hospital referral rate to community MH&SU services was approximately 55% of the identified patients; and the hospital readmission rate within 30 days was approximately 15%. During the three-year pilot there was an increase in community MH&SU referrals by the hospital, from 55% up to 70%. This increase in referrals demonstrated a need to create criteria to determine which patient referrals were appropriate for Primary Care Physicians and Interdisciplinary teams, and which required Specialized MH&SU services.

The DST’s criteria were developed and trialed the following two years of the pilot. After implementation of the DST criteria and processes, the trend of hospital readmissions within 30 days gradually reduced from the initial rate of 15% down to 7.5% by the end of the pilot. This trial provided the appearance that clinical criteria, plus cross-system processes could create an inverse relationship between the two performance measures. The results of this pilot were similar to Stickney, Hall, and Gardner (1980) study about a change in hospital

discharge systems that reduced readmissions by half, when patients were seen by a community MH&SU nurse before discharge and given a specific follow-up appointment with the nurse in the community post-discharge.

Research Study Limitations

The research findings of this study were to identify selected factors and system changes in relation to the two quality performance measures that could provide risk indicators for mental health and substance use patients. It should be noted that retrospective studies can statistically point to associations between mental illnesses and etiological factors, but they cannot prove cause-and-effect relationships (Reddy, 2014).

One of the limitations of this study is that it was based on predetermined variables established in the two health record information systems used by Northern Health. While there is a benefit in having access to a large administrative data set; using existing data limits the research to the pre-set variables for which information was previously gathered. For example, in this study the data on in-hospital treatment (e.g. medications trialed on patients, or electroconvulsive therapy (ECT), were not available so could not be examined). In addition, no "severity" scale was used by hospital care providers to measure symptoms of patients at time of admission and discharge. While the ICD F Code is helpful clinically, a diagnosis does not indicate the patients' level of functioning, severity of illness, or amount of support they may require following discharge. Studying hospital admissions and readmissions that have multi-factorial natures is difficult as not all causal factors are captured with existing data.

Another limitation is possible biases in choice of the ICD diagnostic codes that hospital physicians used as the primary reason for the hospital stay to define the study population. Physicians can ascribe several and a variety of ICD diagnoses to patients for their reasons for the hospitalization at the time of discharge. Deciding which ICD diagnostic code is the primary reason for the hospitalization, compared to which codes are secondary is up to

each physician; however, their decision on order of codes affects who is included in the research, as only patients with a MH&SU code as a primary coding are included in provincial and national research on these measures. ICD diagnostic F coding can also be influenced by physicians' personal views and stigma on some diagnoses and avoidance of others. In smaller communities there are limited numbers of physicians to provide care in clinics and hospitals. As the physicians might know their patients personally in the community, they may be reluctant to use certain diagnostic codes to avoid labeling some patients for mental health and substance use issues.

A different limitation is the data set had missing or incorrect information in some variable fields depending on the nature of involvement. This could be due to patients who experienced an acute mental health or substance use episode that required hospitalization, so not being able to provide the information at that time. Similarly, with community MH&SU data some patients might only be seen at a time of crisis or for brief therapy so limited socio-economic and demographic information was gathered, in comparison to patients who receive long-term case management so more through information can be gathered.

A related information limitation may relate to the patient's age group. This study focuses on 5159 individuals (age 15 years and older) who had a total of 9139 admissions to the hospitals in Northern Health during the five-year period April 1st, 2010 through March 31st, 2015. A total of 4512 of the 5159 individuals (87.5%) received service at some point in time during the five-year period from community mental health and substance use service teams, however the service is primarily for adults (19 years and over). Further analysis would be required to learn about the 647 (12.5%) patients who did not have community MH&SU MRR information and what percentage were youth ages 15 through 18 years. Information on

patients in this age group was not accessible as this service is under the jurisdiction of the Ministry for Children and Family Development (MCFD) child and youth mental health. Similarly, patients age 65 years and over might have received services from Home and Community Care programs, e.g. residential care, or home support, which are also separate clinical information systems. Indigenous patients with First Nations Status may have received follow-up services from a First Nations community health centre, or an Indigenous agency, each having separate patient information systems. Although there are these data limitations, by matching the two Northern Health data sets the analysis was conducted on information on the majority (87.5%) of the patients, to support the findings and effect sizes.

A further limitation was the modification of the timeframe to analyse the performance measures being extended from fiscal years to a five-year period. Initial analysis of the data examined each year separately; by community, health service delivery areas (HSDA), and region. This yearly analysis did not provide statistically significant results, and each year's information was contradicted by results from other years. As well, no annual statistical association was determined between the two performance measures. Due to these results, it was decided to use data from a five-year period to determine if the increased study population size and increased time might provide statistical evidence of patterns and associations.

Another limitation is the inherent assumption regarding the second quality performance measure; increasing the percentage of patients who receive community follow-up within 30 days. The performance measure focuses on increasing the percentage or number of patients who have wait times of less than 30 days when accessing community services. The premise of the measure assumes that increasing the number of patients seen within 30 days (increased volume) in the community should reduce hospital readmissions. However,

using increased percentages as a measure of community follow-up is problematic since it mixes patient needs with the availability of resources in a community; and as such, the measure does not provide a clear direction to prevent rehospitalisation needs and related planning efforts.

The percentage of community follow-up within 30 days might be more reflective of capacity limitations and resource gaps, rather than patients' conditions and needs. The measure's sequential logic is broken between patients' needs, increased community follow-up within 30 days, and hospital readmissions; as percentages do not incorporate patients' clinical conditions or service needs, or availability of services in the community, as prioritization factors in community follow-up within 30 days to reduce readmissions.

Benefits of Research

There are several potential benefits from this research for Northern Health as it provides details on hospitalization events and episodes of care that were previously unknown. One factor was the range in mean numbers of hospitalizations by community size, and the variation in wait days in each community to access MH&SU follow-up services. Second was the increased rate of rehospitalizations experienced by patients identified as Indigenous, and their increased wait time to access community MH&SU follow-up services. Third was patients who were unemployed or not seeking work had a higher number of hospitalizations, and a shorter wait times to access community MH&SU follow-up services. Fourth was patients' marital status was associated with the mean numbers of hospitalizations. Patients in a relationship had lower mean numbers of hospitalizations; whereas not being in a relationship was associated with increased hospitalizations. The opposite occurrence was evidenced with community MH&SU follow-up, with patients who were not in a relationship

generally receiving quicker community MH&SU follow-up services. Fifth, having an eating disorder, or schizophrenia and psychosis leads to increased hospitalizations; correspondingly with both diagnostic groups having the shortest wait to access community MH&SU services. Finally, while the two quality performance measures had a statistical association with each other, the result was the inverse of the premise behind the two quality performance measures; patients who had community MH&SU follow-up within 30 days had higher mean numbers of hospitalizations compared to patients who do not receive this follow-up. The information contained in the analysis of the five factors in relation to the two performance measures could lead to improvements in service quality and patient care in mental health and substance use.

This could be done by conducting a study using the Decision Support Tool (DST) (Table 14) to determine whether the criteria for the two options on community follow-up are clinically fitting, and provide data for service allocations in the community. As illustrated in this paper, many clinical factors have been reviewed to determine their potential relationship to hospital readmissions, with the premise that community follow-up has some level of association to this occurrence. However, the hospital-based readmission factors have had varied and limited results, and community services were not related to the hospitalized population in most of the studies. Using the DST categories to determine the level of community care required (Standard non-complex, or Complex), and tracing the patient's care path could confirm the criteria. Based on this, examining patient numbers with each category and readmission rates could help determine service allocations to support each, and identify areas where there may be service gaps. These findings might provide an alternative quality performance measure to replace percentage of community follow-up within 30 days.

The British Columbia Ministry of Health (MOH) Mental Health & Substance Use Branch (MH&SU), and the new Ministry of Mental Health and Addictions (MMH&A), and several Regional Health Authorities in the province have expressed interest in this research study's findings as the two measures have been used to track performance since the formation of the regional Health Authorities in 2001.

The First Nations Health Authority (FNHA) has also stated interest in the research as it evidenced an over-representation of Indigenous residents in Northern British Columbia being hospitalized for mental health and substance use issues, having higher rehospitalization rates, and longer wait times to access community MH&SU follow-up services. The academic community may also benefit from this research as it provides Canadian information on Northern rural communities served by generalist hospitals; information that might inform health care practice and research topic areas.

Dissemination of Results

Tri-Council Policy Statement (TCPS2) Article 4.7 - Equitable Distribution of Research Benefits, states researchers should consider ways to ensure the distribution of any benefits to participants in the research. In addition, researchers should provide copies of research reports to the host institution or organization (CIHR, NSERC, & SSHRC, 2010).

In alignment with this policy, a copy of the dissertation will be provided to the University of Northern British Columbia library. A copy will be provided to the Northern Health library, which will be available to executive, physicians, hospital administrators, and mental health and addictions staff. The British Columbia Ministry of Health, Mental Health and Substance Use Branch, as well as the Ministry of Mental Health and Addictions will receive a copy; which will likely be provided to the Health and Human Services Provincial

Library. The First Nations Health Authority also requested a copy for their information in policy development, and planning programs and services. The Canadian Institute for Health Information (CIHI) has been informed of this research and will be offered a copy as well. As this research uses secondary, historic, non-identifying data, it will not be possible to distribute the results to the patients whose statistical information was analysed.

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Appendix A

UNBC Research Ethics Board Approval Letter

UNBC UNIVERSITY OF NORTHERN BRITISH COLUMBIA

RESEARCH ETHICS BOARD

MEMORANDUM

To: James Campbell
CC: Glen Schmidt

From: Henry Harder, Chair
Research Ethics Board

Date: January 12, 2018

Re: **E2018.0111.004.00**
Rehospitalization Risk Factors for Mental Illness and Substance Use in Northern British Columbia

Thank you for submitting the above-noted proposal to the UNBC Research Ethics Board. Your application has been reviewed and it has been determined that, as presented to us, REB approval is not required.

If you have any questions, or require further clarification, please feel free to contact Isobel Hartley in the Office of Research (reb@unbc.ca or 250-960-6735).

Sincerely,

Dr. Henry Harder
Chair, Research Ethics Board

Appendix B

Northern Health Authority Research Review Committee Approval Letter

Northern Health Regional Office
600-299 Victoria Street, Prince George, BC V2L 5B8
Telephone: (250) 565-2649, Fax: (250) 565-2640
www.northernhealth.ca

January 29, 2018

James Campbell
PhD Health Sciences
University of Northern British Columbia

File # RRC -2018-0007 Campbell

Via email to: cambej@unbc.ca

RE: **Rehospitalization Risk Factors for Mental Illness and Substance Use in Northern British Columbia**

On behalf of the Northern Health Research Review Committee, I would like to thank you for your application for research approval.

The study has met the review requirements of the Northern Health Research Review Committee and achieved operational approval. You may proceed with your study.

Enjoy your work! We look forward to hearing about your findings. Please share your results with us at ResearchCommittee@northernhealth.ca at the completion of your project.

Sincerely,

Tamara Checkley, Chair, Research Review Committee

Cc Bonnie Urquhart, Regional Director, Planning & Performance Improvement
Cc Dr Glen Schmidt, supervisor

Appendix C

First Nations Health Authority Research Approval Letter

First Nations Health Authority
Health through wellness

501 — 100 Park Royal South
Coast Salish Territory
West Vancouver, BC
Canada V7T 1A2

T 604.693.6500
F 604.913.2081

www.fnha.ca

November 8, 2017

Dr. Henry Harder, Chair, Research Ethics Board (REB)
Office of Research
University of Northern British Columbia
3333 University Way
Prince George, BC V2N 4Z9

Tamara Checkley, Chair, Northern Health Research Committee
Northern Health Regional Office
600–299 Victoria Street
Prince George, BC V2L 5B8

Subject: Letter of Support for James L. Campbell

Dear Dr. Harder and Ms. Checkley,

The purpose of this letter is to confirm the First Nations Health Authority's (FNHA's) support of James L. Campbell's proposed research for his PhD dissertation requirement at the University of Northern British Columbia (UNBC), School of Health Sciences. His research will examine two Provincial quality assurance and performance measures that Northern Health uses for quality improvement of mental health and substance use services.

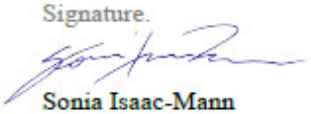
Northern Health has integrated mental health programs and substance use services at all levels of care; from primary and community care, to residential, withdrawal and acute inpatient, and tertiary. The proposed research project will use historic secondary data from these services, and hospital admissions, from the five-year period of April 1, 2010 to March 31, 2015. Initial findings were presented to Northern Health Executive earlier this year. These indicated there is an over-representation of First Nations people hospitalized in Northern hospitals for mental health and/or substance use issues. FNHA North Region is interested in learning why this over-representation in hospitalizations is occurring. Information about reasons people are being admitted, whether they receive NH integrated community MHSU follow-up, and if they reside in First Nations communities would be useful. Potentially, this project could help identify communities where First Nations people have increased needs for mental health and substance use services.

The FNHA's vision is for healthy, self-determining, and vibrant BC First Nations children, families, and communities. FNHA provides health programs and services throughout the province of British Columbia to all First Nations communities. Our organization aims to reform the way health care is delivered to British Columbia First Nations to close these gaps and improve health and wellbeing. Guided by this vision, the FNHA works to reform the way health care is delivered to First Nations in British Columbia through direct service, provincial partnership collaboration, and health systems innovation. Therefore, James L. Campbell's proposed research is relevant and beneficial to FNHA's commitment to improve services by increasing access to care and supporting service delivery models at local and regional levels.

First Nations Health Authority
Health through wellness

In addition, the proposed research aligns with FNHA's strategic goals in priority areas of mental wellness and substance use, primary health care, and rural and remote care.

Signature.



Sonia Isaac-Mann
Vice President, Programs & Services
First Nations Health Authority
501-100 Park Royal South
West Vancouver, BC
V7T 1A2

Appendix D

Mental Illness Diagnosis Categories and Subcategories

Diagnosis Category	Subcategory	DSM-IV Code	ICD-9 and ICD-9-CM Code	ICD-10-CA Code
Organic Disorders	Senile and pre-senile psychotic conditions	290.40–290.43	290.0–290.9	F00–F09, G30
	Transient organic psychotic conditions	293	293.0, 293.1, 293.8, 293.9	
	Other organic psychotic conditions	294.0, 294.8, 294.9, 294.10, 294.11	294.0, 294.1, 294.8, 294.9	
Substance-Related Disorders	Alcoholic psychoses	291.1–291.3, 291.5, 291.81, 291.89, 291.9	291.0–291.9	F10–F19, F55
	Drug psychoses	292.0, 292.11, 292.12, 292.81, 292.82–292.84, 292.89, 292.9	292.0–292.9	
	Alcohol dependence	303.00, 303.90	303.0–303.9	
	Drug dependence	304.00, 304.10, 304.20, 304.30, 304.40, 304.50, 304.60, 304.80, 304.90	304.0–304.9	
	Non-dependent abuse of drugs	291.0, 305.00, 305.1, 305.20, 305.30, 305.40, 305.50, 305.60, 305.70, 305.90	305.0–305.9	
Schizophrenic and Psychotic Disorders	Schizophrenia	295.10, 295.20, 295.30, 295.40, 295.60, 295.70, 295.9	295.0–295.9	F20–F29
	Psychotic	293.81, 293.82, 298.8, 298.9	298.8, 298.9	
	Paranoia, delusional disorders, other psychoses	297.1, 297.3	297.1–297.3, 297.0–297.3, 297.8–297.9, 298.0–298.4	

Diagnosis Category	Subcategory	DSM-IV Code	ICD-9 and ICD-9-CM Code	ICD-10-CA Code
Mood Disorders	Bipolar	296.00–296.06, 296.40–296.46, 296.50–296.56, 296.60–296.66, 296.7, 296.80, 296.89, 301.13	296.0–296.1, 296.4–296.8	F30, F31, F34.0
	Depression	296.20–296.26, 296.30–296.36, 300.4, 311	296.2, 296.3, 300.4, 311	F32, F33, F34.1, F38.1
	Other	293.83, 296.90	296.9	F34.8, F34.9, F38.0, F38.8, F39
Anxiety Disorders	Anxiety	293.84, 300.00–300.02, 300.21–300.23, 300.29, 300.3, 309.81	300.0, 300.2, 300.3, 309.8	F40, F41, F42, F93.0– F93.2
	Acute stress	308.3	308.3	F43.0, F43.1,
Personality Disorders	Personality disorders	301.0, 301.20, 301.22, 301.4, 301.50, 301.6, 301.7, 301.81–301.83, 301.9	301.0–301.9	F60, F61, F62, F68, F69
Other Disorders	Adjustment disorders	309.0, 309.24, 309.28, 309.3, 309.4, 309.9	309.0–309.4, 309.9	F43.2, F99
	Physiological malfunction arising from mental factors		306.0–306.9	F45, F59,
	Sexual disorders	302.2–302.4, 302.6, 302.70–302.76, 302.79, 302.81–302.85, 302.89, 302.9, 306.51	302.0–302.9	F52, F64, F65, F66
	Dissociative and factitious disorders	300.12–300.16, 300.19, 300.6	300.1, 300.6	
	Somatoform disorders	300.11, 300.7, 300.81, 300.82, 307.80, 307.89	300.7, 300.8, 307.8	
	Eating disorders	307.1, 307.50, 307.51	307.1, 307.50, 307.51, 307.54	

Diagnosis Category	Subcategory	DSM-IV Code	ICD-9 and ICD-9-CM Code	ICD-10-CA Code
Other Disorders (cont'd)	Disorders of infancy, childhood and adolescence and developmental disorders	299.00, 299.10, 299.80, 307.0, 307.20–307.23, 307.3, 307.52, 307.53, 307.59, 307.6, 307.7, 307.9, 309.21, 312.81, 312.82, 312.89, 312.9, 313.23, 313.81, 313.82, 313.89, 313.9, 314.00, 314.01, 314.9, 315.00, 315.1, 315.2, 315.31, 315.32, 315.39, 315.4, 315.9, 317, 318.0–318.2, 319	299.0, 299.1, 299.8, 299.9, 307.0, 307.2, 307.3, 307.6, 307.7, 307.9, 312.0, 312.1, 312.2, 312.4, 312.8, 312.9, 313.0–313.3, 313.8, 313.9, 314.0–314.2, 314.8, 314.9, 315.0–315.2, 315.3, 315.4, 315.5, 315.9, 317–319	F63, F80-F89, F91, F92, F95
	Sleep disorders	307.42, 307.44–307.47	307.4	
	Impulse control disorders	312.30–312.34, 312.39	312.30–312.35, 312.39	
	Mental disorders due to a general medical condition not elsewhere classified	293.89, 293.9, 310.1		
	All other psychiatric disorders	300.9, 316	300.5, 300.9, 308.0–308.2, 308.9, 310, 316	

Note

- The grouping methodology is under review; potential changes will be reflected in future versions of *Hospital Mental Health Services in Canada*.

Sources

- WHO (2010) International Classification of Diseases, 9th Revision (ICD-9), & Clinical Modification (ICD-9-CM);
- WHO (2010) International Statistical Classification of Diseases and Related Health Problems, 10th Revision, Canada (ICD-10-CA);
- APA (2000) Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-TR-IV)

CIHI 30-Day Readmission for Mental Illness

Indicator Description and Calculation

Description

- The indicator measures the risk-adjusted rate of readmission following discharge for a mental illness.
- Note - For further details, please see the General Methodology Notes.

Calculation: Description

- Risk-adjusted rate for each region = Observed number of readmissions in each region ÷ Expected number of readmissions in the region × Canadian average readmission rate

Unit of Analysis: Episode of care

- An episode of care refers to all contiguous inpatient hospitalizations in general and psychiatric hospitals and all-day surgery visits regardless of diagnoses. To construct an episode of care, a transfer is assumed to have occurred if the following condition is met:
    - Admission to a general/psychiatric hospital or day surgery facility occurs on the same day as discharge from another general/psychiatric hospital or day surgery facility
    - Calculation: Geographic Assignment - Place of residence
    - Calculation: Type of Measurement - Rate - per 100
    - Calculation: Adjustment Applied -
    - The following covariates are used in risk adjustment:
    - For a detailed list of covariates used in the model, please refer to the Model Specification document.
    - Calculation: Method of Adjustment - Logistic regression

Denominator - Description:

- Number of episodes of care for a mental illness discharged between April 1 and March 1 of the fiscal year

  Inclusions:

    1. A mental illness is identified by DSM-IV/DSM-5 diagnostic category in Ontario Mental Health Reporting System (OMHRS) data or by the most responsible diagnosis (MRDx) ICD-10-CA codes in Discharge Abstract Database (DAD)/Hospital Morbidity Database (HMDB) data
    2. Diagnosis codes for mental illness:
        i. Substance-related and addictive disorders: ICD-10-CA: F10 to F19, F55, F63.0; DSM-IV diagnostic category: (d) substance-related disorders; DSM-5

diagnostic category: (p) substance-related and addictive disorders

ii. ii. Schizophrenia and other psychotic disorders: ICD-10-CA: F20, F21, F22, F23, F24, F25, F28, F29; DSM-IV diagnostic category: (e) schizophrenia and other psychotic disorders; DSM-5 diagnostic category: (b) schizophrenia spectrum and other psychotic disorders

iii. Mood disorders: ICD-10-CA: F30, F31, F32, F33, F34, F38, F39, F53.0, F53.1; DSM-IV diagnostic category: (f) mood disorders; DSM-5 diagnostic category: (c) bipolar and related disorders or (d) depressive disorders

iv. Anxiety disorders: ICD-10-CA: F40, F41, F42, F93.0 to F93.2, F94.0; DSM-IV diagnostic category: (g) anxiety disorders; DSM-5 diagnostic category: (e) anxiety disorders

v. Selected disorders of personality and behaviour: ICD-10-CA: F60, F61, F62, F68 (excluding F68.1), F69; DSM-IV diagnostic category: (p) personality disorders; DSM-5 diagnostic category: (r) personality disorders

vi. Other disorders

ICD-10-CA

F42, F43, F44, F45, F48.0, F48.1, F48.8, F48.9, F50, F51, F52, F53.8, F53.9, F54, F59, F63 (excluding F63.0), F64, F68.1, F70 to F73, F78 to F79, F80 to F84, F88 to F89, F90, F91, F92, F93.3, F93.8, F93.9, F94.1, F94.2, F94.8, F94.9, F95, F98.0, F98.1, F98.2, F98.3, F98.4, F98.5, F98.8, F98.9, F99, O99.3

DSM-IV diagnostic category

(a) Disorders of childhood/adolescence

(c) Mental disorder due to medical conditions

(h) Somatoform disorders

(i) Factitious disorders

(j) Dissociative disorders

(k) Sexual and gender identity disorders

(l) Eating disorder

(m) Sleep disorder

(n) Impulse-control disorders

(o) Adjustment disorders

DSM-5 diagnostic category

(a) Neurodevelopmental disorders

(f) Obsessive-compulsive and related disorders

(g) Trauma- and stressor-related disorders

(h) Dissociative disorders

(i) Somatic symptom and related disorders

(j) Feeding and eating disorders
(k) Elimination disorders
(l) Sleep–wake disorders
(m) Sexual dysfunctions
(n) Gender dysphoria
(o) Disruptive, impulse-control and conduct disorders
(s) Paraphilic disorders
(t) Other mental disorders

3. Discharges between April 1 and March 1 of the following year (period of case selection ends on March 1 to allow for 30 days of follow-up)
4. Sex recorded as male or female
5. Admission to a general or psychiatric hospital (Facility Type Code = 1, 5)

Exclusions:

1. Records with an invalid health card number
2. Records with an invalid code for province issuing health card number
3. Records with an invalid admission date
4. Records with an invalid discharge date
5. Discharges as deaths (Discharge Disposition Code = 07 for DAD/NACRS records; Discharge Reason Code = 2 or 3 for OMHRS)
6. Cadaveric donor or stillbirth records (Admission Category Code = R or S)
7. Records that are dead on arrival (Discharge Disposition = 11 for NACRS)

Numerator - Description:

- Cases within the denominator with a readmission for a mental illness within 30 days of discharge after the index episode of care

Inclusions:

1. An episode of care is considered a readmission if the two following conditions are met:
   a. It has occurred within 30 days of discharge of an index episode; and
   b. A mental illness was identified the same way as for the denominator (see Denominator for criteria to select diagnosis).

Background, Interpretation and Benchmarks

Rationale

- Readmission to inpatient care may be an indicator of relapse or complications after an inpatient stay. Inpatient care for a person living with a mental illness aims to stabilize acute

symptoms. Once stabilized, the individual is discharged, and subsequent care and support are ideally provided through outpatient and community programs to prevent relapse or complications. High rates of 30-day readmission could be interpreted as a direct outcome of poor coordination of services *and/or an indirect outcome of poor continuity of services after discharge.*

- Interpretation - Lower rates are desirable.
- HSP Framework Dimension - Health System Outputs: Person-centred
- Areas of Need - Living with Illness, Disability or Reduced Function
- Targets/Benchmarks - Not applicable

References

Canadian Institute for Health Information. (2008). Hospital Mental Health Services in Canada 2005–2006.

Hermann R, Mattke S. (2004). Selecting Indicators for the Quality of Mental Health Care at the Health System Level in OECD Countries.

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Lin E, Durbin J, Zaslavska M, et al. (2008). Hospital Report 2007: Mental Health.

http://indicatorlibrary.cihi.ca/display/HSPIL/30-Day+Readmission+for+Mental+Illness

Appendix E

Reddy's Groupings of Variables

The below variable headings and groupings follow Reddy's (2014) recommended categories for analyzing data involving mental health and substance use patients. Reddy used a total of nine variable groupings. This research did not collect any information for the "Treatment" group heading (Number 7). For the eight other groupings, a total of thirty-one (31) variables were collected in the research data for analysis, although only 7 were used for this research. The full list of variables initially reviewed were:

1. **Demographic** – age, sex, etc.,
    a) City the Hospital is located in (18 hospitals) (C2)
    b) Sex Codes (C7) (Female, Male)
    c) Age at First Hospital Admission (all ages 15 to 99), plus –
        1. (Census Canada 5-year age groupings) &
        2. (3 Age Groups = 15-18 years, 19-64 years, & 65 years +)
2. **Socio-cultural** – religion, ethnicity, domicile, etc.,
    d) Indigenous Identity Indicator (C12) (Yes, No); and (Yes, No, & Unknown)
    e) Indigenous Identity Group (C13) (First Nations, Métis, Inuit)
    f) First Nations Indicator Status (C14) (Status, non-Status)
    g) Living On-Reserve Indicator (C15) (Yes, No, Unknown)
3. **Socio-economic** – education, occupation, income, etc.,
    h) Education Level highest completed (C16) (grades, college, & university)

i) Education Engagement at Time of Service (C17)

j) Employment Status Declaration (C18)

k) Employment Hours (C19)

4. **Family** – marital status, family type, family structure, family size, etc.,

l) Marital Status (C8) (Single, Married, Divorced, Widowed, Separated)

m) Household Composition (C11) (Alone, With Others, etc.)

n) Living Arrangement (S10) (Own, Rent, Supports, Facility, Homeless, etc.)

o) Parenting Status (S23) (No Children, Children with others).

p) Pregnancy Status (S22)

5. **Signs and symptoms** – hallucinations, delusions, etc.,

q) Trauma and Violence History (C28) (Yes, No)

r) History of Suicide Attempts (C27) (Yes, No)

s) Recent Suicide Attempt – 24 hours (S24)

6. **Diagnostic** – schizophrenia, mania, etc.,

t) Age First Used Alcohol (C29) (all ages); and (Census Age Groups)

u) Age First Used Marijuana (C31) (all ages); and (Census Age Groups)

v) Criminal Justice Involvement (C22)

w) Nature of Criminal Justice Involvement (C23)

x) ICD Diagnostic F Codes – Initial Hospitalization (Individual); and (Six Diagnostic Clusters)

y) ICD Diagnostic F Codes – First Readmission (Individual); and (Six Diagnostic Clusters)

7. **Treatment** – psychotropic drugs, ECT, psychotherapy, etc.,
    - *NOTE: No information on this variable topic area was obtained from hospital records or the community MH&SU information system.*
8. **Hospitalization** – duration or length of stay, etc.,

    z) Rehospitalization (Yes, No)

    aa) Numbers of Hospital Admissions for each of the patients (1 to 36)

    bb) Episode One – Length of Stay (LOS) number of days; and (Grouped Days)

    cc) Episode Two – Length of Stay (LOS) number of days; and (Grouped Days)

    dd) Total Days Length of Stay (LOS) - All 36 Hospitalizations by Number of Patients
9. **Outcomes** – type of discharge, result of treatment, etc.

    ee) Community MH&SU Follow-up within the 30-day Measure (Yes, No)

    ff) Wait Days after Initial Hospitalization until Community MH&SU Follow-up (Number of days); and (Grouped Days)

    gg) Wait Days after First Readmission until Community MH&SU Follow-up (Number of days); and (Grouped Days)

    hh) Community MH&SU – Enrollment (GAF) Global Assessment of Functioning

    ii) Community MH&SU – Discharge (GAF) Global Assessment of Functioning

Descriptive Frequencies of Selected Variables

To provide an overall picture, this section provides descriptive frequencies of selected variables regarding patients who were hospitalised for mental health and substance use issues. The patient-based independent variables (IVs) describe the socio-economic, demographic, and clinical characteristics of this patient population who were admitted to the 18 hospitals in Northern British Columbia. For this research, the MH&SU MRR data available through the Northern Health Authority was accessed, but data was not available from:

1. Specialized programs provided by the Provincial Health Services Authority (PHSA) (e.g., forensic services);
2. Youth and youth mental health services provided through the Ministry for Children and Family Development (MCFD; and
3. Services delivered by contracted providers.

Frequency Variables Described With Tables

The first frequency variable category used by Reddy (2014) is "Demographic":

1. Demographic – location/city, patients' age, and sex;

a) City/Community the hospital is located in.

Northern Health Hospitals and Hospitalizations by Community

There are 18 acute care medical hospitals in the Northern Health Authority geographic region where patients can be admitted for mental health and/or substance use illnesses. The frequency numbers are based on the number patients (5159) who were hospitalized for mental

health and/or substance use diagnoses; and do not reflect the number of hospitalizations and readmissions (9103) that occurred at each community hospital during the five-year period.

Table 15 *Frequencies – No. of Patients Hospitalized by Community in 5-Years*

Community	HSDA	Frequency	Percent
Chetwynd	East	49	.9
Dawson Creek	East	604	11.7
Fort Nelson	East	284	5.5
Fort St. John	East	265	5.1
Quesnel	Interior	456	8.8
Burns Lake	Interior	102	2.0
Mackenzie	Interior	52	1.0
McBride	Interior	12	.2
Vanderhoof	Interior	156	3.0
Fort St James	Interior	65	1.3
Prince George	Interior	1712	33.2
Smithers	West	241	4.7
Kitimat	West	179	3.5
Terrace	West	403	7.8
Masset	West	55	1.1
Prince Rupert	West	374	7.2
Queen Charlotte City	West	56	1.1
Hazelton	West	94	1.8
Total		5159	100.0

d) Indigenous Identity Indicator (C12)

The definition for this category is whether a "person identifies as an Aboriginal person; First Nations, Métis, or Inuit" (BC Ministry of Health, MH&SU MRR, 2017). Most patients who were hospitalized for mental health or substance use issues were non-Aboriginal 2269 (44.0%). The second largest group were Aboriginal 1265 (24.5%). For a significant number of patients whether they had an Indigenous identify was either Unknown/not asked 978 (19.03%), or the data was Missing 647 (12.5%).

Although almost one-third of the identity indicator data was either Unknown/not asked or Missing, this research used the verified percentage (24.5%) for statistical analysis when considering whether patients were Indigenous, instead of the valid percentage of 28.0%.

Table 16 *Frequencies - Indigenous Cultural Identity*

Code	Indigenous Cultural Identity	Frequency	Percent	Valid Percent
1	Indigenous	1265	24.5%	28.0%
2	Non-Indigenous	2269	44.0%	50.3%
98	Unknown/not asked	978	19.0%	21.7%
	Missing (not in community MRR)	647	12.5%	100.0%
	TOTAL	5159	100.0%	

e) Indigenous Identity Group (C13)

This definition asks the "Aboriginal group that the Aboriginal person identifies with". The values for this category are whether the Indigenous patients identified as either: First Nations, Métis, Inuit, or Unknown/not asked (BC Ministry of Health, MH&SU MRR, 2017).

These numbers are slightly less than the previous table, showing the total as 1182 (22.9%). For the three Indigenous group options, the largest is First Nations 950 (18.4%), followed by Métis 227 (4.4%), with lesser number of Inuit 5 (0.1%). A total of 294 (5.7%) were Unknown/not asked. In addition, for this classification grouping 3036 (58.8%) were Null, plus 647 (12.5%) had Missing information.

Table 17 *Frequencies - Indigenous Cultural Identify Sub-Categories*

Code	Indigenous Cultural Identity Sub-Categories	Frequency	Percent
1	First Nations	950	18.4%
2	Métis	227	4.4%
3	Inuit	5	0.1%
98	Unknown/not asked	294	5.7%
99	NULL	3036	58.8%
	Missing (not in community MRR)	647	12.5%
	TOTAL	5159	100.0%

f) First Nations Status Indicator (C14)

The definition for this indicator is an "Aboriginal person who is registered under the Indian Act of Canada" (BC Ministry of Health, MH&SU MRR, 2017). The value labels based on the Indian Act are; Status Indian, and Non-Status Indian, plus Unknown/not asked, or NULL. Of the 867 (16.8%) patients who identified as First Nations based on the Indian Act of Canada, 649 (12.6%) had Status, and 218 (4.2%) were Non-Status. Another 362 (7.0%) had Status unknown or not asked. Most patients who had been hospitalized for mental

health or substance use issues were NULL or not First Nations 3283 (63.6%), and another 647 (12.5%) had Missing information.

Table 18 *Frequencies - First Nations 'Status' Classifications*

Code	First Nations 'Status' Classifications	Frequency	Percent
1	Status Indian (Indian Act of Canada)	649	12.6%
2	Non-Status Indian (Indian Act of Canada)	218	4.2%
98	Unknown/not asked	362	7.0%
99	NULL	3283	63.6%
	Missing (not in community MRR)	647	12.5%
	TOTAL	5159	100.0%

g) Living On Reserve Indicator (C15)

The definition for this indicator is "Identifies if the First Nations person is living on reserve" (BC Ministry of Health, MH&SU MRR, 2017). The value labels are; Predominately lives on reserve, Predominately lives off reserve, Unknown/not asked, and NULL. Of the 876 (17.0%) patients who identified as First Nations, 211 (4.1%) live predominantly on-reserve and would receive Primary Care and community support services through the Band's Health Centre. These services are funded by the First Nations Health Authority and delivered by the Band or Tribal Council, either directly or through contracted service provider.

Most First Nations patients who live predominantly off-reserve 665 (12.9%), would receive their Primary Care and community support services through Northern Health directly or contracted agency. A further 301 (5.8%) were unknown or not asked whether they lived on

or off reserve. The majority of patients were not considered First Nations 3335 (64.6%), and 647 (12.5%) had Missing information.

Table 19 *Frequencies - First Nations Living On or Off Reserve*

Code	First Nations Living On or Off Reserve	Frequency	Percent
1	Predominantly lives on-reserve	211	4.1%
2	Predominantly lives off-reserve	665	12.9%
98	Unknown/not asked	301	5.8%
99	NULL	3335	64.6%
	Missing (not in community MRR)	647	12.5%
	TOTAL	5159	100.0%

3. Socio-economic – education, occupation, income, etc.,

h) Employment Status Declaration (C18)

This category is the "declared primary employment status" of the patient (BC Ministry of Health, MH&SU MRR, 2017). The values are: Employed, Homemaker, Student, On Disability, On Sick Leave, Supported Employment, Supported Volunteer Service, Peer Support, Retired, Unemployed, Not in Labour Force, Other and Unknown/not asked. Around the time of hospitalization, the largest group of patients were Unemployed but eligible to work 1053 (20.4%). The second largest group was Employed 857 (16.6%). They were followed closely by patients On Disability from work 775 (15.0%).

A few patients were Not in the Labour Force (not seeking work) 221 (4.3%). Patients who were Students 196 (3.8%), were similar in numbers to Retired 173 (3.4%).

Homemakers 141 (2.7%) and Other employment status 86 (1.7%) made up the next groups. There were a few patients that received Supported Employment funding 26 (0.5%), or Peer Support 6 (0.1%), plus Volunteers 5 (0.1%). A significant number of patients' employment status was either Unknown/not asked 828 (16.0%), Missing 647 (12.5%), or Not Applicable 31 (0.6%).

Table 20 *Frequencies - Employment Status Classifications*

Code	Employment Status Classifications	Frequency	Percent
1	Employed	857	16.6%
2	Homemaker – household & partner earns income	141	2.7%
3	Student – even if employed	196	3.8%
4	On Disability – short or long term from employment	775	15.0%
5	On Sick Leave – from employment	114	2.2%
6	Supported Employment – funding from Ministries	26	0.5%
7	Supported Volunteer Service – funded from Ministries	5	0.1%
8	Peer Support funding – from other Ministries	6	0.1%
9	Retired	173	3.4%
10	Unemployed – employable & seeking work	1053	20.4%
11	Not in Labour Force – not seeking work	221	4.3%
97	Other – employment status not in other categories	86	1.7%
98	Unknown/not asked	828	16.0%
99	Not applicable	31	0.6%
	Missing (not in community MRR)	647	12.5%
	TOTAL	5159	100.0%

i) Marital Status (C8)

The definition is “legal marital status under the law or as registered by the state at time of first service” (BC Ministry of Health, MH&SU MRR, 2017). The values are: Never

married – single, Married or common law, Widowed, Separated, Divorced, Unknown/not asked. Of the patients hospitalized primarily for a mental health or substance use issue, the largest number were Never married - single 1950 (37.8%). The second size group were patients who were Married or common-law 921 (17.9%). The third group were patients who were Separated 358 (6.9%), followed by patients were Divorced 256 (5.0%), and patients who were Widowed 132 (2.6%). A sizable number of patients' marital status was either Unknown/not asked 895 (17.3%), or the data was Missing 647 (12.5%).

Table 21 *Frequencies - Marital Status Classifications*

Code	Marital Status Classifications	Frequency	Percent
1	Never married – single	1950	37.8%
2	Married or common-law	921	17.9%
3	Widowed	132	2.6%
4	Separated	358	6.9%
5	Divorced	256	5.0%
98	Unknown/not asked	895	17.3%
	Missing (not in community MRR)	647	12.5%
	TOTALS	5159	100.0%

5. Diagnostic – schizophrenia, mania, etc.,

x) ICD Diagnostic F Code Clusters (six diagnostic clusters)

The mental health or substance use diagnoses for each patients' admission and any subsequent readmissions were grouped into six ICD diagnostic categories for analysis:

1) Substance-related (F10-19),
2) Schizophrenia and psychosis disorders (F20-29),
3) Mood and affective disorders (F30-39),
4) Anxiety disorders (F40-49),
5) Eating disorders (F50), and,
6) Personality and behaviour disorders (F60-69).

These six diagnostic groupings were initially examined to look at prevalence of each for initial admission, and the subsequent readmissions. The diagnostic groupings were also examined in relation to readmissions, and community follow-up rates. This analysis was done using crosstabs and chi square. As the number of diagnoses varied for each cluster or grouping, statistical weighting was used to determine significance (five by six matrix).

First Hospitalization: ICD Diagnostic Code Groupings

Of the six ICD F Code diagnostic classification groupings used by the hospital physicians as reasons patients were admitted for a mental health or substance use issue; the two largest categories were, F30 to F39 Mood (affective) disorders, and F10 to F19 Mental and behavioural disorders due to psychoactive substance use (which includes alcohol). These two classification groups made up approximately two-thirds of the admissions.

Mood (affective) disorders was the largest group with 1826 (35.4%) of the patients. The second largest group, mental and behavioural disorders due to psychoactive substance use was similar with 1726 (33.5%) of the patients. The third largest diagnostic group was F20 to F29, schizophrenia, schizotypal, and delusional disorders for which 809 (15.7%) of the patients were admitted. The fourth grouping was F40 to F 49, neurotic, stress-related, and

somatoform disorders (includes anxiety) for which 681 (13.2%) of the patients were admitted. The fifth, or second smallest grouping was F60 to F69, disorders of adult personality and behaviour for which 75 (1.5%) of the patients were admitted. The smallest diagnostic group for admissions was F50 to F59, behavioural syndromes associated with physiological disturbances and physical factors (which includes eating disorders), for which 42 (0.8%) of the patients were admitted.

Table 22 *Frequencies - ICD F Code Groups for Initial Hospitalization*

CODE	ICD Diagnostic Groupings	Frequency	Percentage	Cumulative Percent
F10-F19	Mental & Behavioural, Alcohol & Substances	1726	33.5%	33.5%
F20-F29	Schizophrenia, Schizotypal, & Delusional	809	15.7%	49.1%
F30-F39	Mood (affective) Depression disorders	1826	35.4%	84.5%
F40-F49	Neurotic, Stress-Related, Somatoform, Anxiety	681	13.2%	97.7%
F50-F59	Physiological Disturbances & Eating disorders	42	0.8%	98.5%
F60-F69	Adult Personality & Behavioural disorders	75	1.5%	100.0%
	Total	5159	100.0%	

Table 23 *ANOVA - Communities by Number of Hospitalizations*

Community & HSDA	No. Patients	Mean	Std. Deviation	Max No. Hospitalizations
Chetwynd, NE	49	1.33	1.049	8
Fort St James, NI	65	1.42	.827	4
*Fort St. John, NE	265	1.43	1.123	9
*Vanderhoof, NI	156	1.44	.924	7
Mackenzie, NI	52	1.52	1.291	7
McBride, NI	12	1.58	.996	4
Hazelton, NW	94	1.61	1.370	7
*Dawson Creek, NE	604	1.68	1.630	16
Burns Lake, NI	102	1.74	1.888	10
*Prince George, NI	1712	1.74	1.620	19
Prince Rupert, NW	374	1.79	1.641	12
Quesnel, NI	456	1.80	1.735	16
Kitimat, NW	179	1.84	2.209	23
Smithers, NW	241	1.85	2.786	36
Queen Charlotte City, NW	56	1.95	2.040	13
Masset, NW	55	1.98	1.861	10
*Terrace, NW	403	2.05	2.157	23
*Fort Nelson, NE	284	2.18	1.993	14
Total Region	5159	1.76	1.759	36

Table 24 *ANOVA - Employment Category by Number of Hospitalizations*

Employment Categories	N	Mean	Std. Deviation	Maximum
Unknown/Not asked	1464	1.32	0.764	8
Employed	857	1.62	1.318	14
On Sick Leave	114	1.64	1.168	9
Not Applicable	31	1.65	1.684	10
Student	196	1.67	1.926	19
Homemaker	141	1.72	1.374	7
Retired	173	1.73	1.28	10
Peer Support	6	1.83	1.169	4
Supported Employment	26	1.92	1.468	8
Unemployed	1053	1.96	1.845	19
Other Employment	86	2.33	2.698	18
Not Seeking Work	221	2.40	2.171	14
On Disability	775	2.42	2.687	36
Volunteer	5	7.20	6.797	19
Total	5148	1.77	1.761	36

Table 25 *ANOVA - Marital Status by Number of Hospitalizations*

Marital Status	N	Mean	Std. Deviation	Maximum
Unknown	1542	1.30	0.843	10
Married or Common Law	921	1.65	1.424	18
Widowed	132	1.83	1.668	11
Separated	358	1.87	1.789	14
Divorced	256	2.00	1.937	16
Never Married	1950	2.13	2.255	36
Total	5159	1.76	1.759	36

Table 26 *ANOVA - ICD Diagnostic F Code by Number of Hospitalizations*

ICD Diagnostic F Code Groups	N	Mean	Std. Deviation	Maximum
F40-F49 Anxiety & Adjustment	681	1.50	1.522	23
F30-F39 Bipolar & Depression	1826	1.63	1.456	19
F10-F19 Alcohol & Substance Use	1726	1.73	1.597	16
F60-F69 Personality Disorders	75	1.81	1.43	8
F20-F29 Schizophrenia & Psychosis	809	2.34	2.497	36
F50-F59 Eating Disorders	42	2.36	3.721	19
Total	5159	1.76	1.759	36

Table 27 *ANOVA – Communities by Community MH&SU Follow-up Days*

Community & HSDA	No. Patients	Mean	Std. Deviation	Maximum
Smithers, NW	180	2.97	2.033	7
Dawson Creek*, NE	495	3.02	1.917	7
Prince George*, NI	1399	3.07	2.006	7
Quesnel*, NI	389	3.13	1.833	7
Masset, NW	47	3.26	2.080	7
Terrace*, NW	314	3.32	2.217	7
McBride, NI	7	3.43	2.440	6
Fort St. John, NE	188	3.55	2.250	7
Kitimat, NW	133	3.63	2.091	7
Prince Rupert, NW	269	3.67	2.062	7
Queen Charlotte City, NW	34	3.71	2.263	7
Mackenzie, NI	36	3.72	2.051	7
Burns Lake, NI	59	3.97	2.385	7
Vanderhoof, NI	112	4.16	2.116	7
Fort Nelson, NE	195	4.39	2.214	7
Fort St James, NI	48	4.50	2.379	7
Chetwynd, NE	30	4.57	2.144	7
Hazelton, NW	54	4.87	2.190	7
Total	3989	3.34	2.093	7

Mean: 1=0-3 days, 2=4-7 days, 3=8-15 days, 4=16-30 days, 5=31-60 days, 6=61-365 days.

Table 28 *ANOVA - Employment Category by Community MH&SU Follow-up Wait*

Employment Category	N	Mean	Std. Deviation	Maximum
Volunteer	5	1.40	0.894	3
Peer Support	5	2.40	2.608	7
On Sick Leave	106	2.73	1.552	7
On Disability	735	2.88	1.877	7
Homemaker	134	3.13	1.806	7
Employed	773	3.15	2.020	7
Retired	154	3.16	1.952	7
Other Employment	74	3.31	1.993	7
Not Seeking Work	202	3.35	2.078	7
Unemployed	976	3.43	2.170	7
Supported Employment	23	3.43	1.854	6
Student	157	3.68	2.048	7
Not Applicable	25	3.88	1.986	7
Unknown/Not asked	571	3.92	2.246	7
Total	3940	3.31	2.075	7

Mean: 1=0-3 days, 2=4-7 days, 3=8-15 days, 4=16-30 days, 5=31-60 days, 6=61-365 days.